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Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

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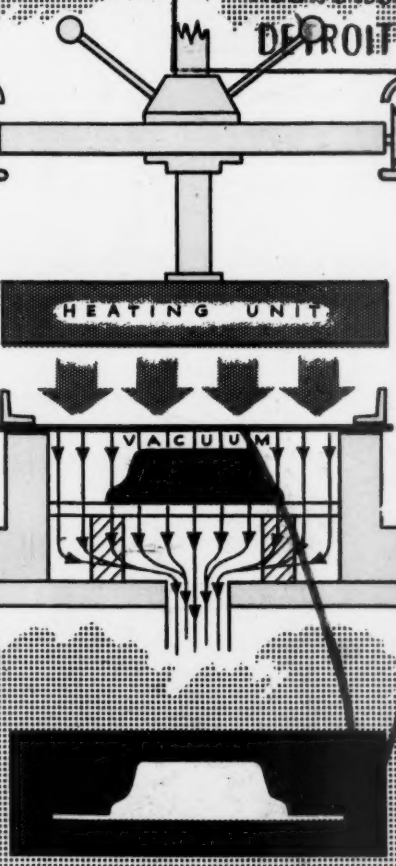

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Mouldrite is the registered trade mark for the thermosetting moulding powders manufactured by I.C.I.
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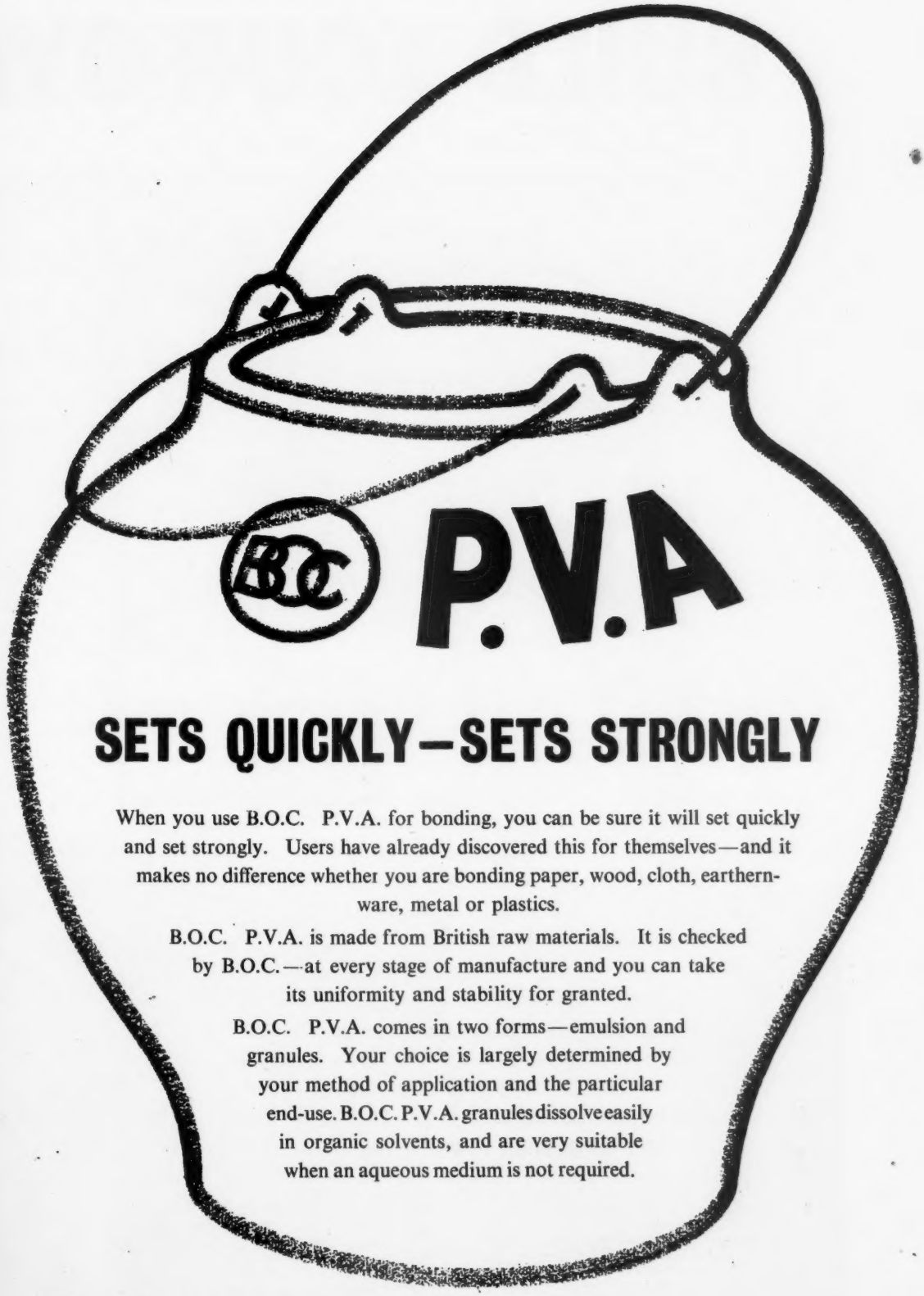

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BUILD YOUR OWN

Plastics manufacturer builds special cooling tower

Stadium Ltd., of Ponders End, Middlesex, plastic mouldings manufacturers, urgently needed a special cooling tower to work in conjunction with plastic injection plant. This picture shows the tower they built for themselves using light alloy Dexion 225; cheap to erect, sturdy in structure, it was tailor-made to meet their needs. This is just one example of the versatility of this economical structural material.

EQUIPMENT—

quickly, cheaply, strongly, *exactly as you want it*—with versatile DEXION slotted angle

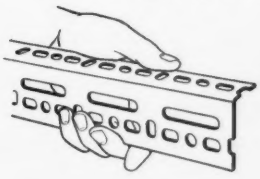
R almost any kind of works or storage equipment ou may need — storage racking, machine stands, eys, work-benches, maintenance platforms, and ndred other items — you'll find Dexion Slotted le the sturdiest, cheapest, most versatile material. exion is far easier and quicker to work with than d or angle iron. It merely needs cutting and ng together — no precise measurements or detailed wings, no drilling or welding, no skilled carpentry, painting. *The work has been put into it already*, so unskilled labour can handle any job. You get tly the structures you need, without delay, and rally at a big saving.

exion is scientifically designed so that every slot hole has a function, and the remaining metal is where it gives greatest strength. It *tinues* to save you money, because any ion structure can be swiftly altered or nantled and the Dexion used again. re is no waste, no scrap.

Dexion is the Slotted Angle that started an industry. Now, over 75 million feet are being used by more than 45,000 firms all over the world. *And 80 per cent of Dexion sales are repeat orders.*

GET THE FACTS

Dexion 225 is sold in packets of ten 10-ft. lengths, complete with bolts. Steel Dexion *(price from 1/3½ to 1/5 per foot)* is rust-protected, stove enamelled. Where a light but strong, non-magnetic, non-corroding material is required, use Alloy Dexion (full technical details and prices on request). Dexion Service offers advice or design assistance on any problem, and construction teams are available. Send today for sample piece of Dexion and booklet AB. 131 illustrating uses in many industries. Dexion Ltd., 65 Maygrove Road, London, N.W.6. (Telephone: MAIda Vale 6031-9.)



DEXION

SLOTTED ANGLE

ICI solve a problem

Empty drums represent only one of the storage problems that Dexion Slotted Angle helps to solve in industry. This sturdy, inexpensive rack was constructed by ICI Paints Division at their Glasgow works.

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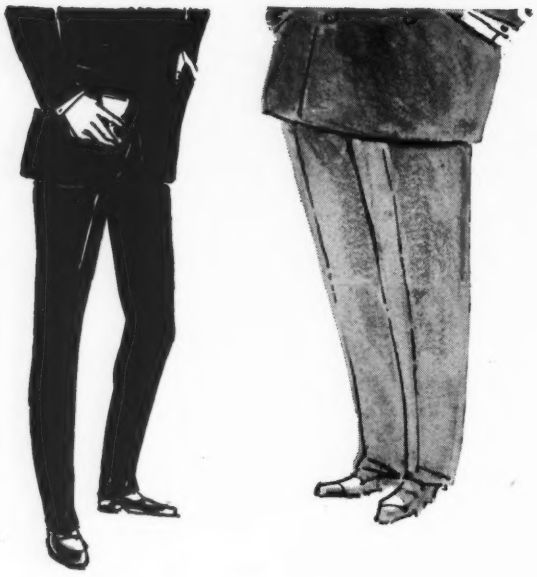

At Barry, Glamorgan, a large modern factory has been designed and is being built especially for the production of STYRON 475 and 666. This announcement is of the greatest importance to manufacturers and moulders throughout the United Kingdom and abroad — British-made STYRON* will be freely available to all! British Resin Products Limited— as the sole selling agents for STYRON POLYSTYRENE — welcome and will deal promptly with all enquiries about STYRON from British production.

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The very wide study made by Greenwich of the many different requirements in plastics to-day has resulted in the production of a really comprehensive range to meet all needs.

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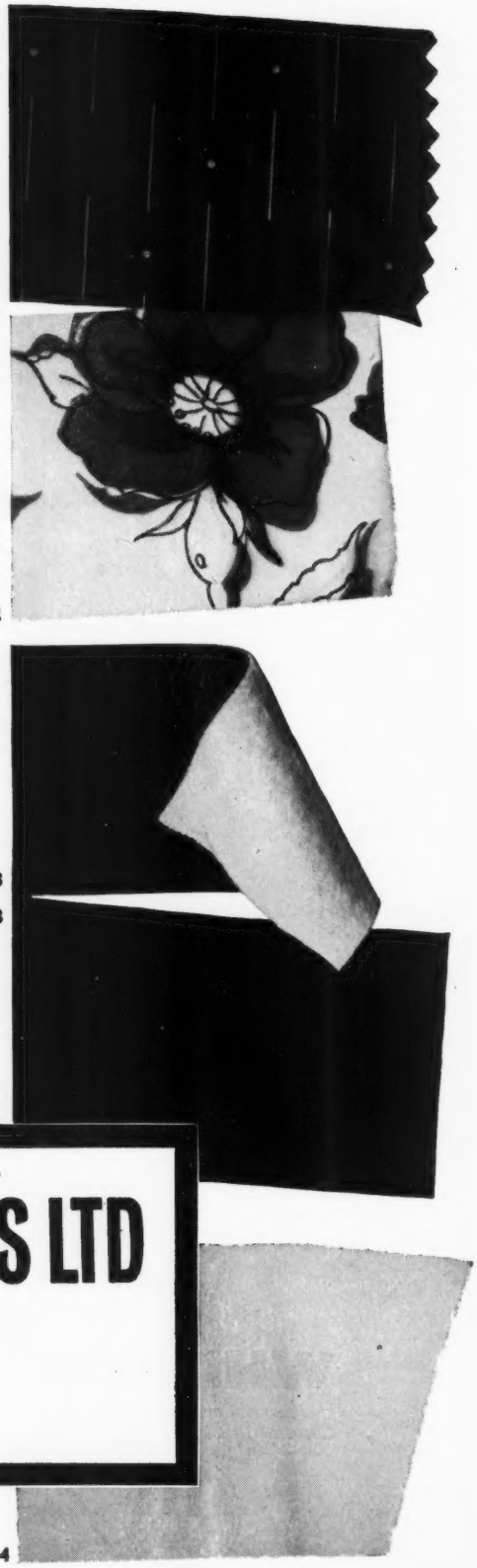

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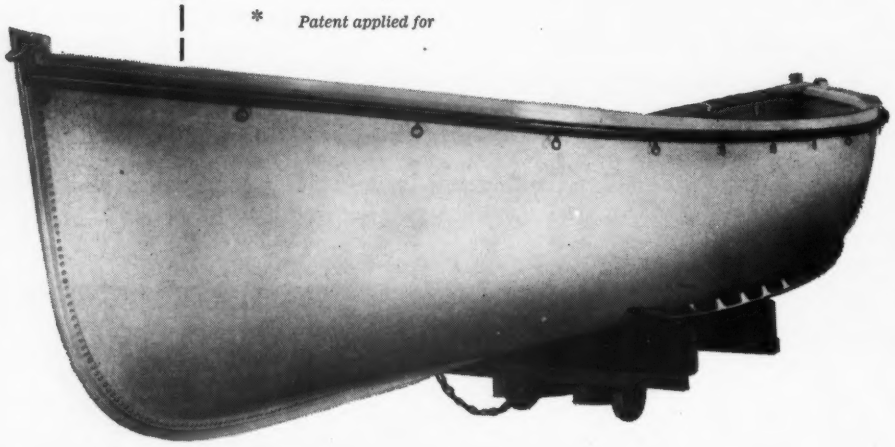
* *Patent applied for*



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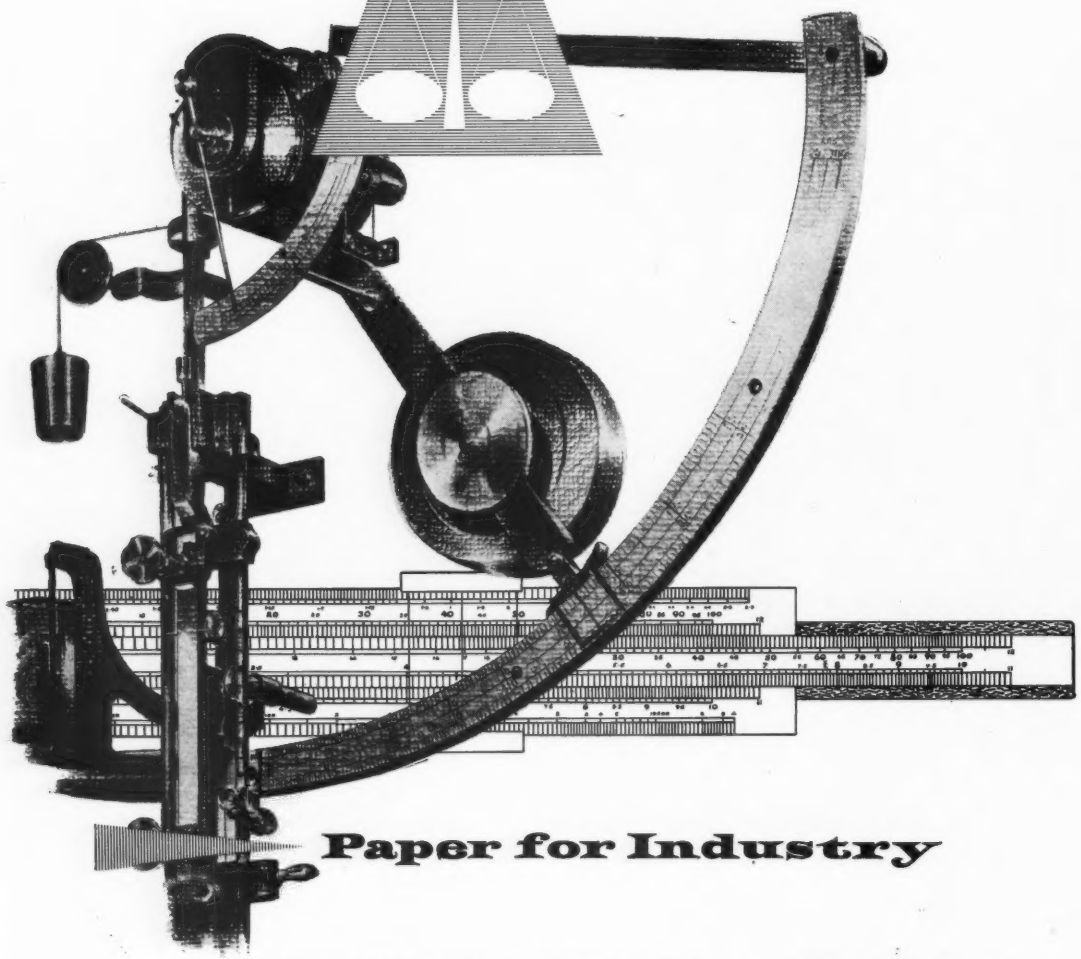

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Papermaking is not yet a precise science, and as a compromise between conflicting requirements in paper has often to be made, it is only by very careful scientific control that the final specification can be met. The Wiggins Teape Group is well equipped with the most up-to-date control methods and in addition has nearly 200 years of papermaking know-how and experience. New industrial uses for paper cover a large part of the Research programme of the Group.

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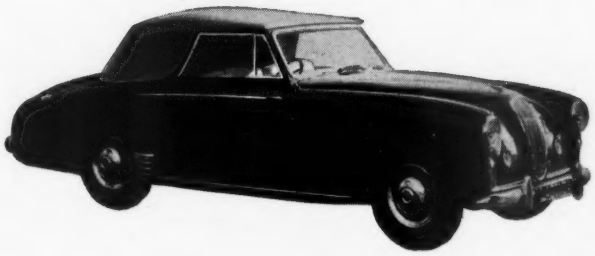

hood up– hood down...

David Brown Lagonda Drop-head coupé

. . . this handsome Lagonda drop-head coupé is definitely built for all-weather motoring. Up or down, the hood is one of the outstanding features of this car—because it is in Everflex leathercloth, made with Geon PVC. Through summer sun and winter rain . . this tough yet elegant material will neither crack nor flake . . and will remain completely waterproof, even after years of use. Only an occasional wipe with a damp cloth is needed to keep it always in immaculate showroom condition.

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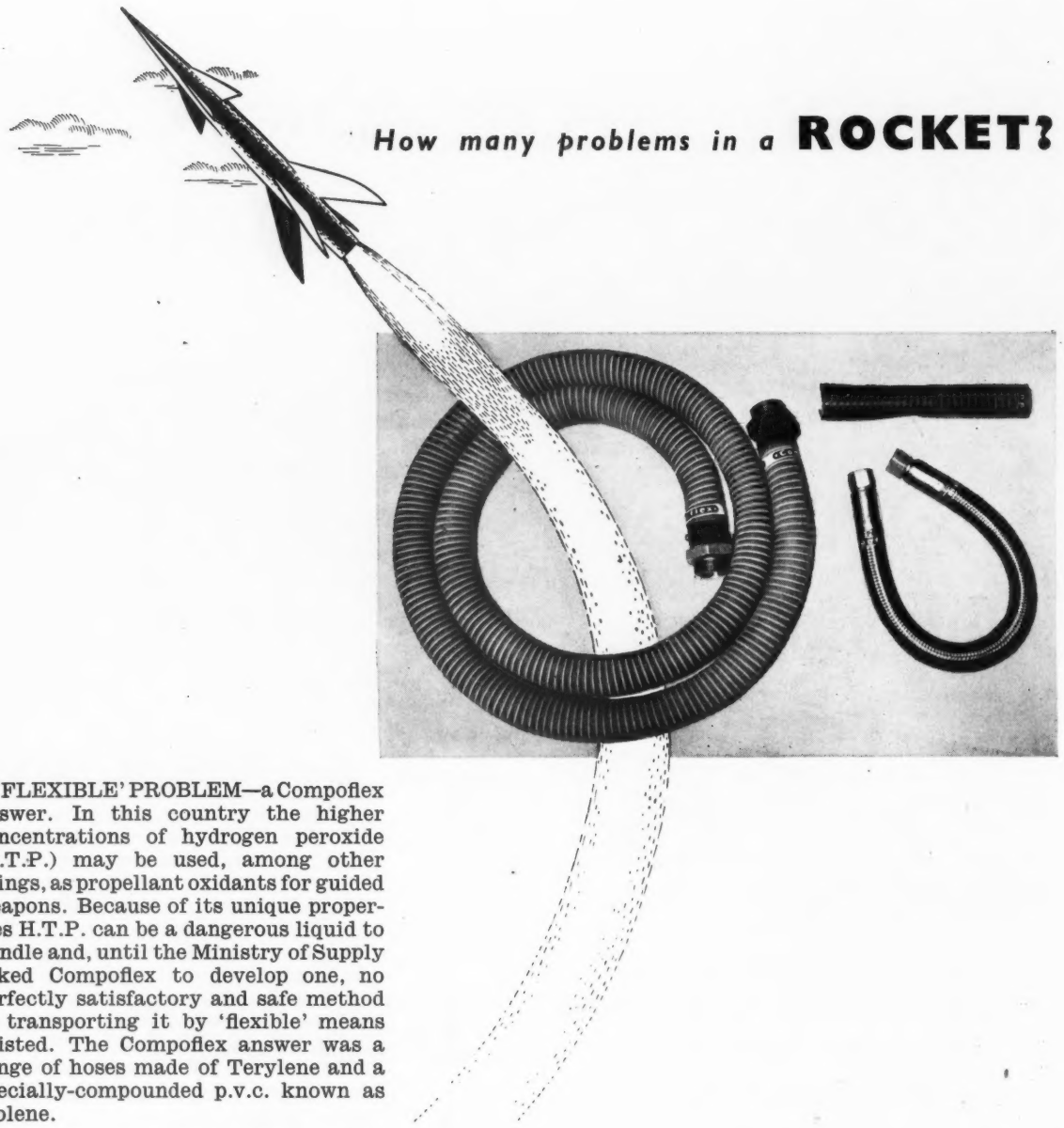

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Particle size (inches)	1/10
Specific Gravity	1·47
Bulk Factor	2·4—2·6
Powder Density	0·55—0.60
Time of Cure of Test Cup (secs.) ...	45—55
Recommended flow range	3—10
Shrinkage (thou./in.)	5·5—6·5
Flowability (cm.)	9
Brinell Hardness	30—35
Impact Strength (ft./lb.)	0·13—0·18
Tensile Strength (lb./sq. in.)	6,500—7,500
Elastic Modulus in tension (lb./sq. in.) (at 0·1% strain)	$1{\cdot}4 \times 10^6$
Water Absorption (mg.) (7 days) ...	50—100
Plastic Yield Grading (°C.)	140
Dimensional Stability after heating (thou. per in. of moulding)	2
Volume Resistivity (as moulded) ($\log_{10}$ ohm cm.)	1·0—1·2

Volume resistivity figures shown mean that the resistance between top and bottom electrodes in B.S.771 apparatus is of the order of 0·2—0·3 ohms.

This material has been developed for use as bearings and for application where an electrical conducting path is required.

A very arid fellow was blacksmith Ephraim Stampenclang—especially when working with his back to the forge. It was not surprising, therefore, to find him—in that inordinately hot August of 1862—resting a foot on the anvil and lubricating himself from a quart tankard of ale. While thus preparing for the day ahead, there was a loud explosion and a blinding flash as his grounded foot contacted a live wire that trailed from the rafters. Recovering from the shock,* Ephraim picked up a horse-shoe blank and introduced it into the arc that played between his toes and the anvil. Seconds later, it was heated to incandescence and hammered into shape.

In this manner (and without the discomfort of an overheated smithy) Ephraim was able to mass-produce horse-shoes and devote more time to the slaking of his unconquerable thirst . . . and 1862, you may recall, was a grand vintage year.

FERGUSON'S, too, were quick to realise the advantages of Self-lubrication and Electrical Conductivity to the Plastic Moulding world, so they produced 'NESTORITE' Grade A.1083 which offers both—in generous measure.

* *Critics remind us that electricity was not in general use in* 1862 . . . *this anecdote proves otherwise.*

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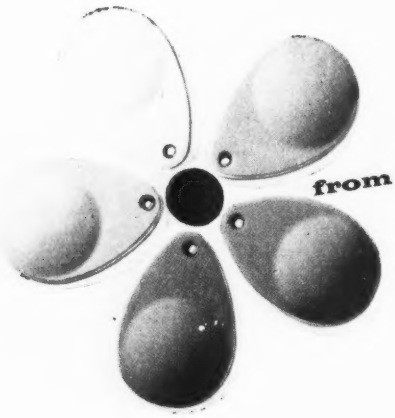
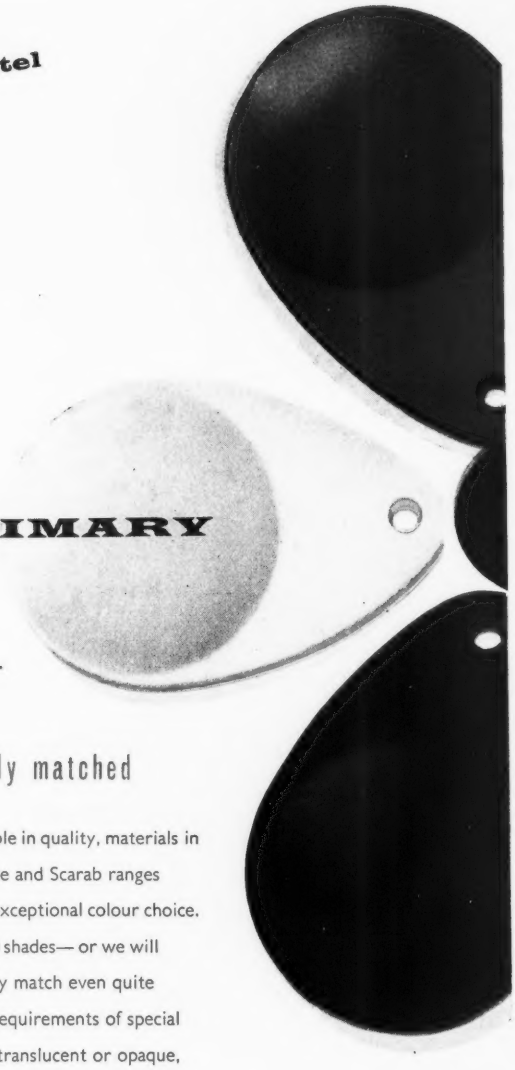


from palest pastel



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over **300** colours to choose from . . .

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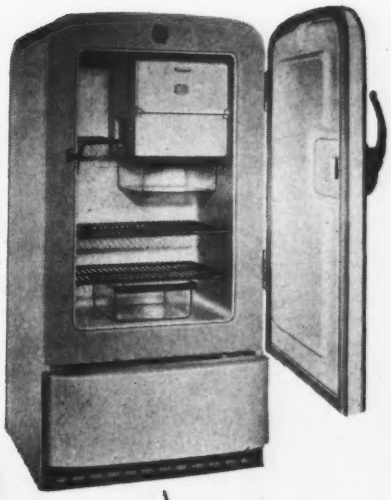

that's fixed that!

R. & A. Main Ltd. have been using Spire Speed Nuts for some time, well pleased with the large saving in assembly time and material cost that results wherever these fasteners are in use. When Main Refrigeration Ltd., the newest member of the Group, designed their No. 32 Refrigerator recently, Spire fasteners were considered for every possible location. The result — 71 parts per unit, placed as follows. SNO nuts (illustrated) secure back mask joint, breaker strip clip, catch and catch block; SNU nuts fix back masks, liner masks, flue restrictor and breaker strip; SM/V grips hold the shelf supports, and SCG clips secure the catch masks; there's an SCA clip for the gas cock knob and an SCG clip for the thermostat. All these jobs, and many others besides, can be done quicker, cheaper and better by Spire.

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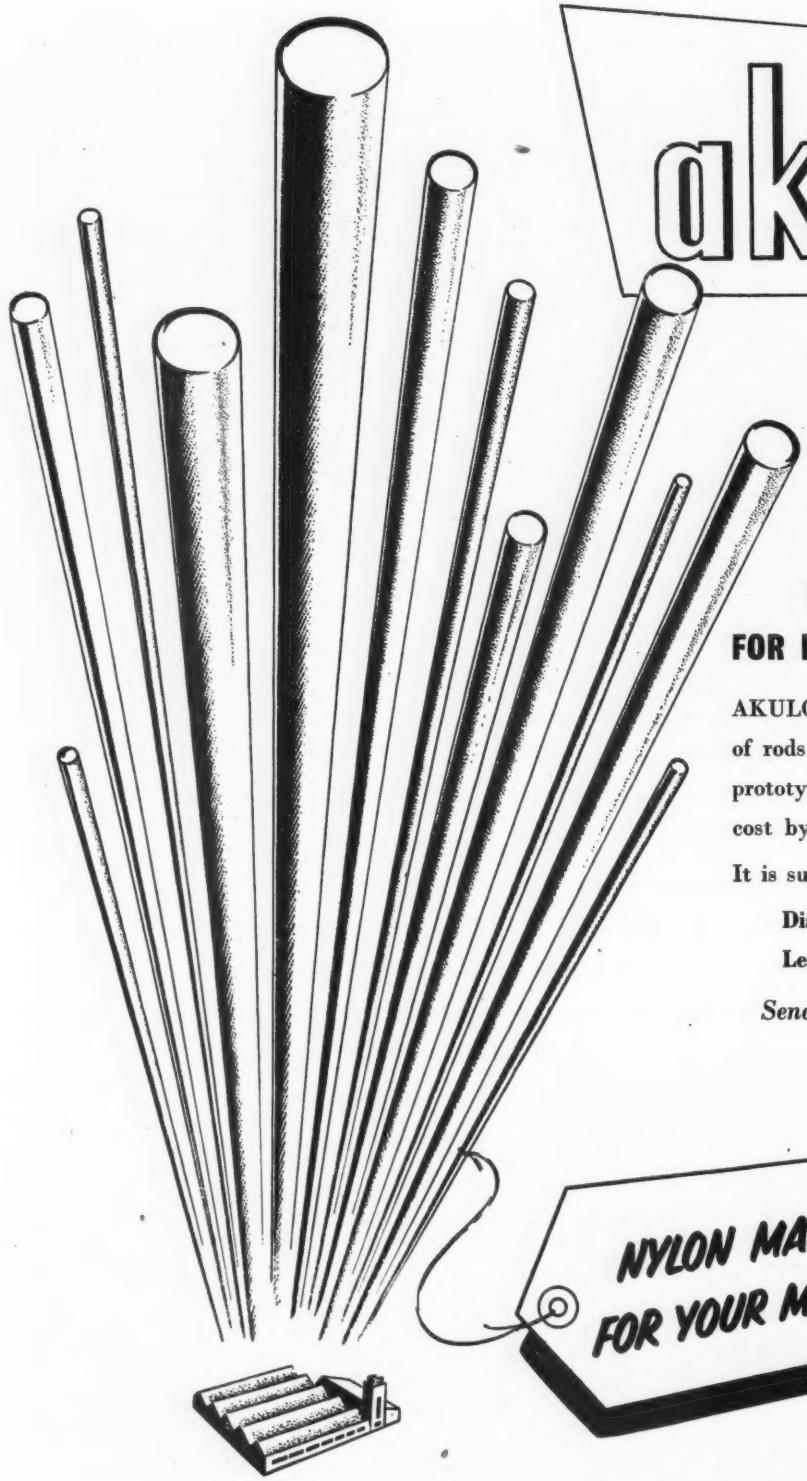

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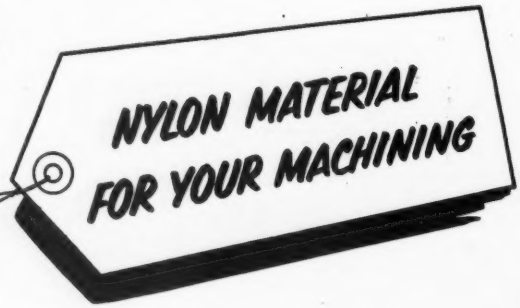

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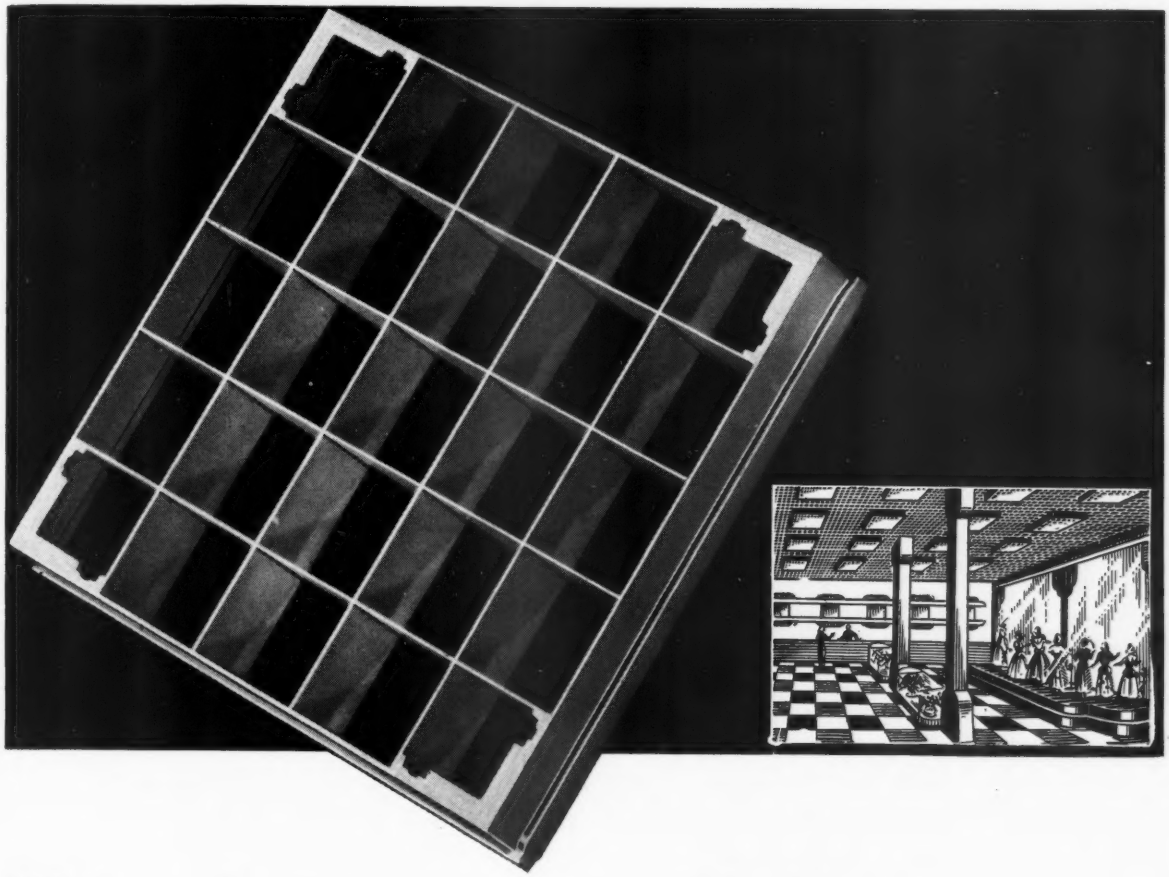

We threw new light on this problem

The design of Office, Showroom and Shop Lighting has developed considerably in recent years and there is no doubt that the new 'Handslite Luve-Tile' now being marketed by Harris & Sheldon Electrical Ltd., is far in advance of its contemporaries. The 14-ounce injection moulding illustrated shows one of the sections which are mounted together, side by side, to fit into a metal frame let into the ceiling. Extreme accuracy in moulding was essential and a light resistant polystyrene, which will not discolour in use, was selected. This moulding is yet another excellent example of what can be achieved when a progressive manufacturer joins forces with one of the largest and most experienced independent plastic moulding organisations in the country. Our thirty years' specialised experience in producing accurate mouldings with an unequalled surface finish, by compression or injection, is at your service.

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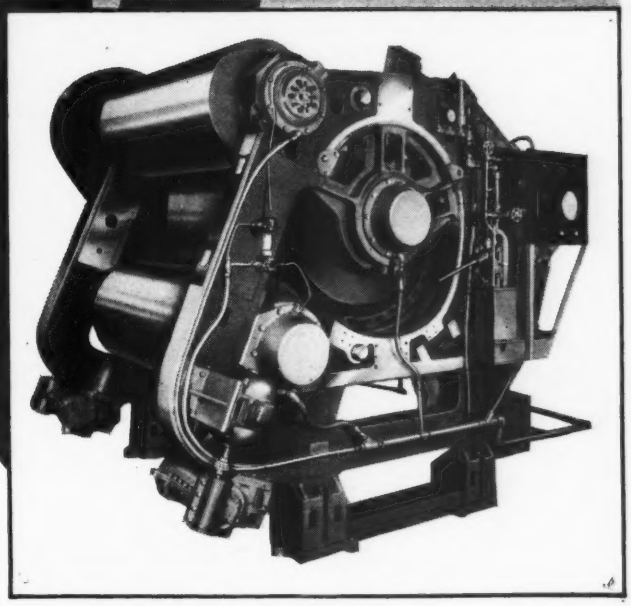

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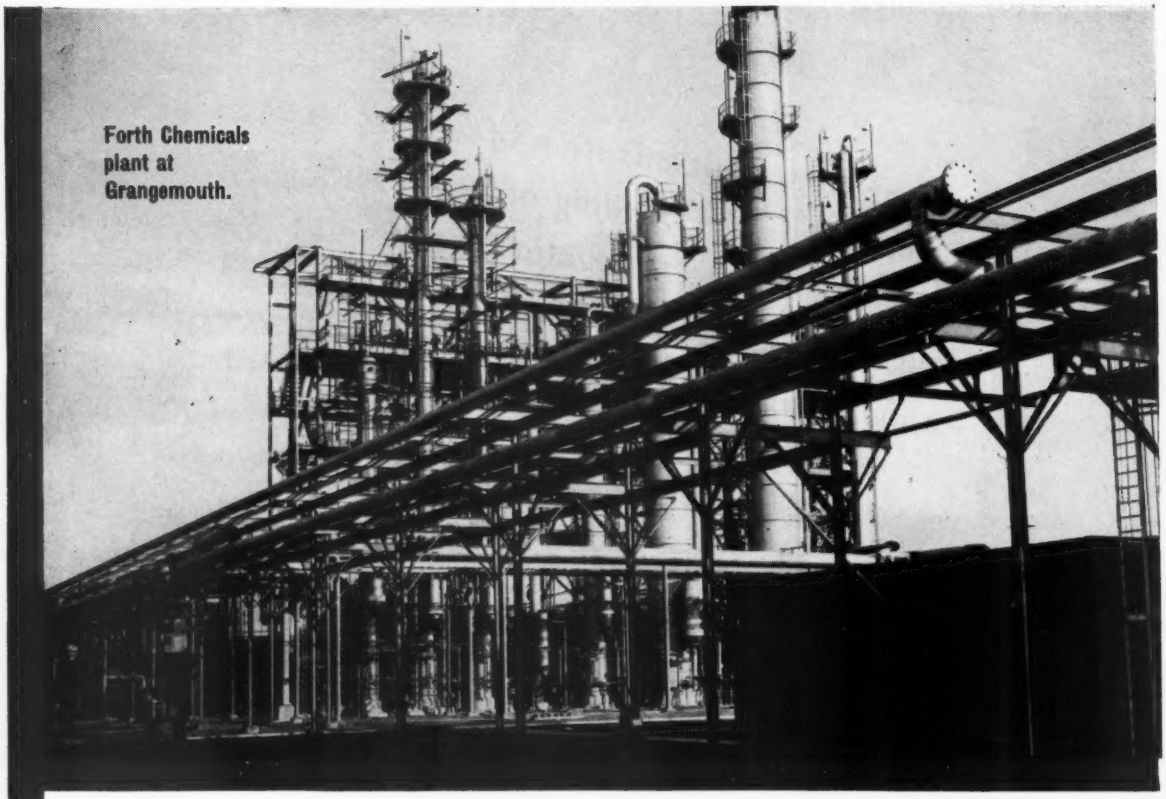

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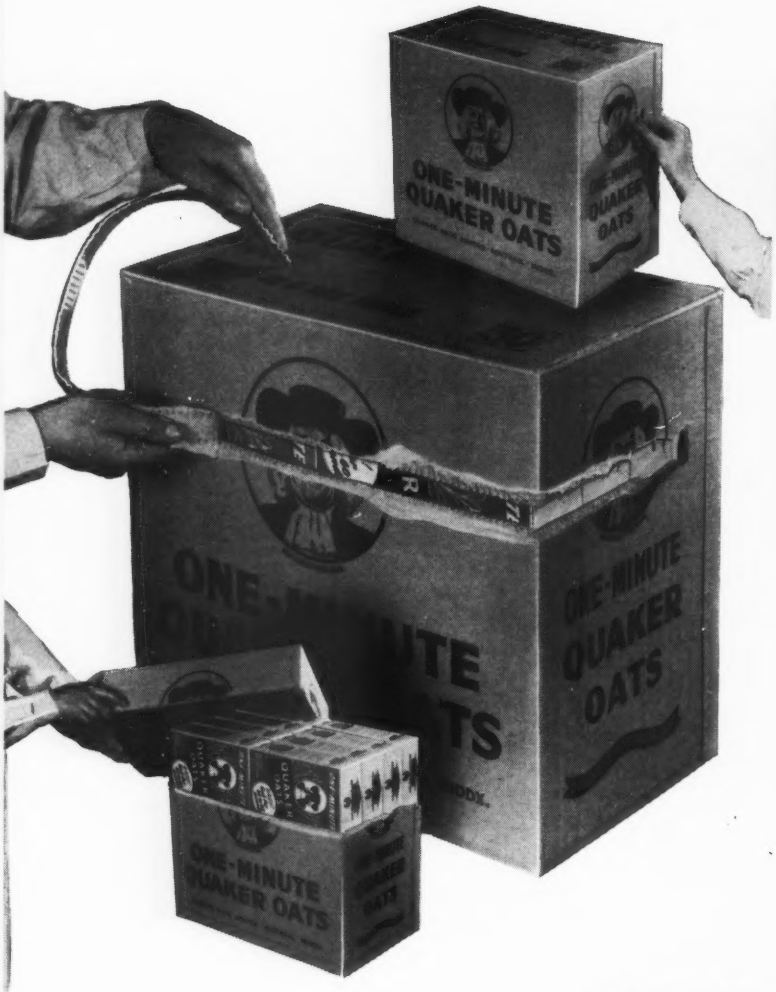


BOWATER

Development is in the air at Bowaters. New projects—part of the recently announced plans for the future expansion of the Organisation—will increase the output of packaging materials, particularly multiwall sacks and corrugated fibreboard containers. The Organisation's research facilities will also be strengthened. These new resources will be harnessed to the task of giving even better service to a widening circle of Bowater customers.

Opening Score

Another Bowater 'first'. Anticipating the demand for a cheaper tear-open corrugated case, Bowaters have developed the production of cases employing a new easy-opening device.

Instead of using a tear-tape, the new method consists simply of two parallel slits running all round the inner liner. The cases are as easily—and as quickly—ripped open as the tear-tape type but, naturally, production costs are lower. *The upcharge on Bowaters slit-liner cases is only one-third of that carried by cases employing a tear-tape.*

This Bowater development brings the advantages of easy-opening cases within the reach of an even wider range of manufacturers. The advantages? Quicker unpacking for the retailer and so more goods on display; no goods rendered unsaleable through careless slitting of the outer package.

Other advantages are less direct but nonetheless powerful. Tear-open cases are new—brand new. The manufacturer who adopts them immediately gains a marketing plus which can lead to increased dealer enthusiasm and greater sales.

If you would like to know more, Bowaters will be glad to hear from you.

Good for Sales

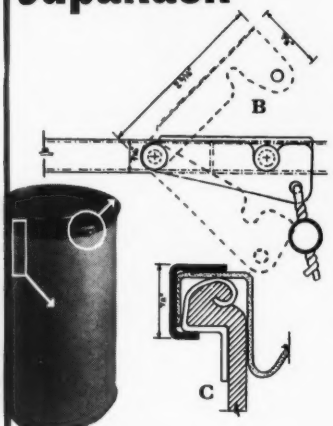
One after the other they go into the shopping basket—bread, frozen fish, sweets, biscuits. And when the housewife gets them home they taste exactly as they should. Individual flavours and odours have been unaffected by their journey home together.

How is that possible? Each of these products is wrapped in waxed paper. Bowaters turn out miles of it every week. Waxed wrappers provide a low-cost answer to the problem of how to preserve the freshness and flavour of mass-produced food items.

Bowater waxed wrappers not only keep the product in good condition, they make it look good and *feel* good. The shining waxed surface displays colour printing beautifully—important when so much shopping is done on sight and on impulse.

PACKAGING BULLETIN

Fibre + Steel = Supakask



—The Supakask
—Detail of pilfer-proof clip.
—Section across wall of drum showing lid held surely in position by locking band.

There are many points of interest about the Supakask—Bowaters' new fibre and steel drum. Take that full open top, for example. It means speed and ease in filling and emptying.

The steel lid makes a snug fit with the drum. Add the locking band, with its pilfer-proof clip, and the closure between lid and drum is sound, sealed and secure. If the nature of the goods or conditions of transport or storage demand it, a rubber gasket can be introduced.

The popularity of the Supakask, and light-weight fibre drums generally, continues to grow and polythene liners are being increasingly used to widen the range of the commodities they can carry. The Supakask is wound without stitching so that the inside is absolutely smooth and there is no risk of snagging or tearing any liner.

Note: Full open top — smooth inside wall

Glassine—that remarkable member of the greaseproof family—protects many of the food industry's products while enhancing their quality feel and sales appeal. Glassine bags can be cut to fit a variety of other products, too, including medical supplies and small engineering parts.

So many food products, high in grease content or easily spoiled by moisture vapour, get that extra protection from laminated glassine. Food and cake mixes, particularly, demand unusual care in their packaging. Their ingredients vary in grease and moisture content but it is absolutely vital that their individual properties should be retained to preserve the quality and balance of the mix.

Many wise manufacturers use Bowaters' laminated glassine bags as carton liners. Maybe you could, too?

WHY PAY MORE . . .

. . . for protection that your product does not need?

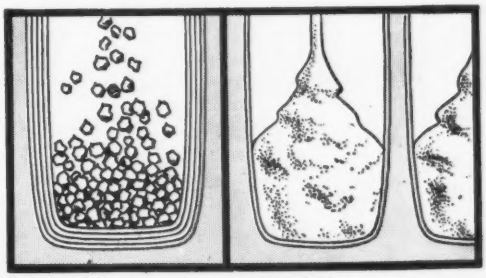
The construction of Bowaters' multiwall sacks is such that you can have exactly the amount of protection your product needs, according to its nature and the risks it runs in transit. Both the number and the type of plies can be varied. You only pay for the protection you need—and no more.

Soft fine powders, for instance, packed (by Bowater machinery, for preference) and dispatched for almost immediate use, may well be sufficiently protected by a simple two or three-ply

Immediate delivery— or long storage?

sack. On the other hand, a sharp edged crystalline substance, destined to be stacked high and stored for long periods, will require several layers of protection. Tough Kraft paper—bitumen laminated or combined with glassine or polythene—may be used to build up the strength and special protective properties of the multiwall sack.

What protection does your product require? Bowaters can advise and their advice will make sure that you do not pay more than you need.



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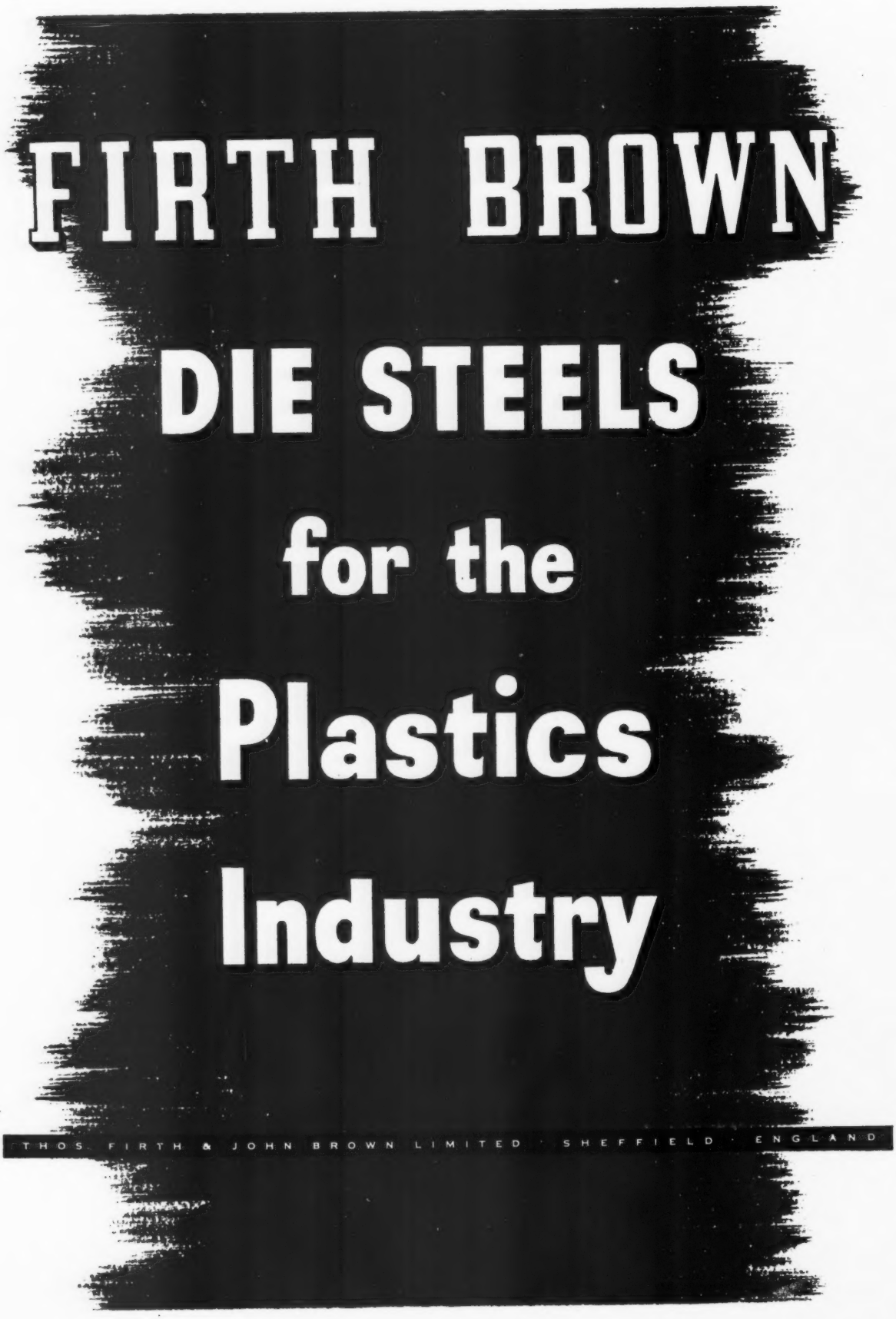
Bowaters make FIBRE DRUMS, MULTIWALL SACKS, PROTECTIVE PACKAGING PAPERS, CORRUGATED CASES, PAPER AND FILM BAGS *and will be glad to tell you more about their advantages in your business.*

Please write to: **Divisional Sales Manager, Packaging Division, Bowater House, Stratton Street, London W.1 GRO: 4181**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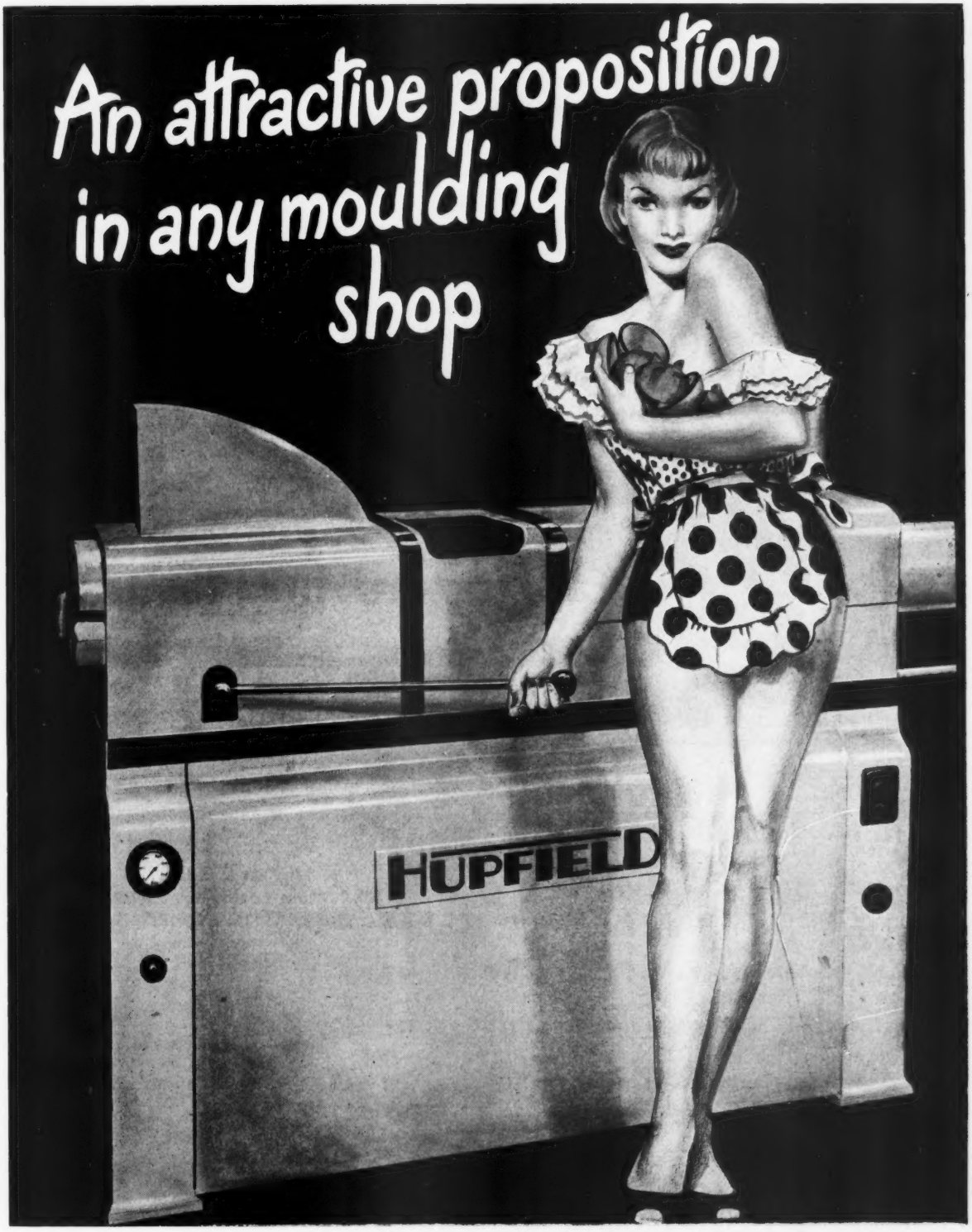

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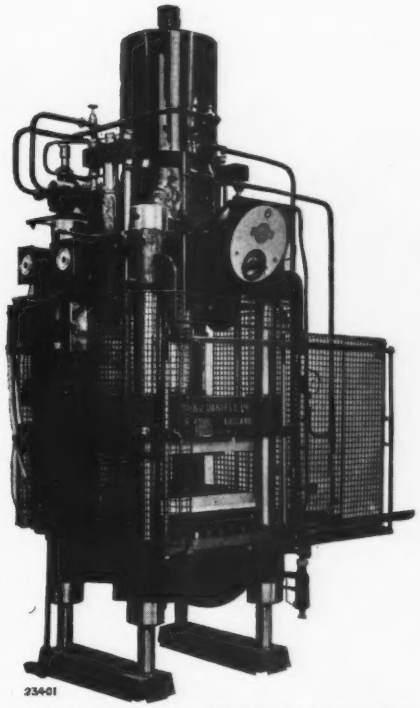

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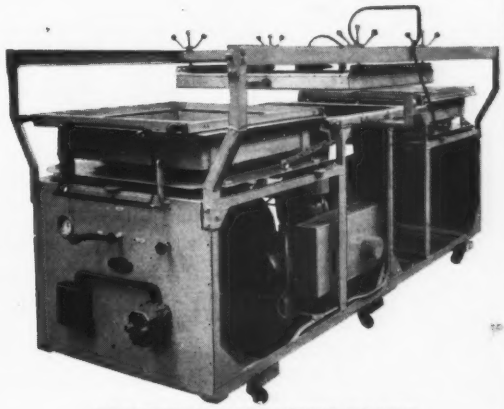

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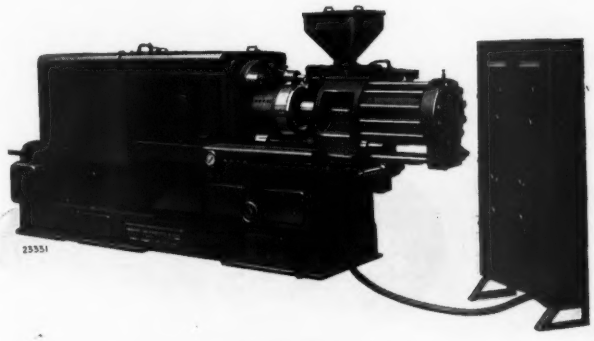

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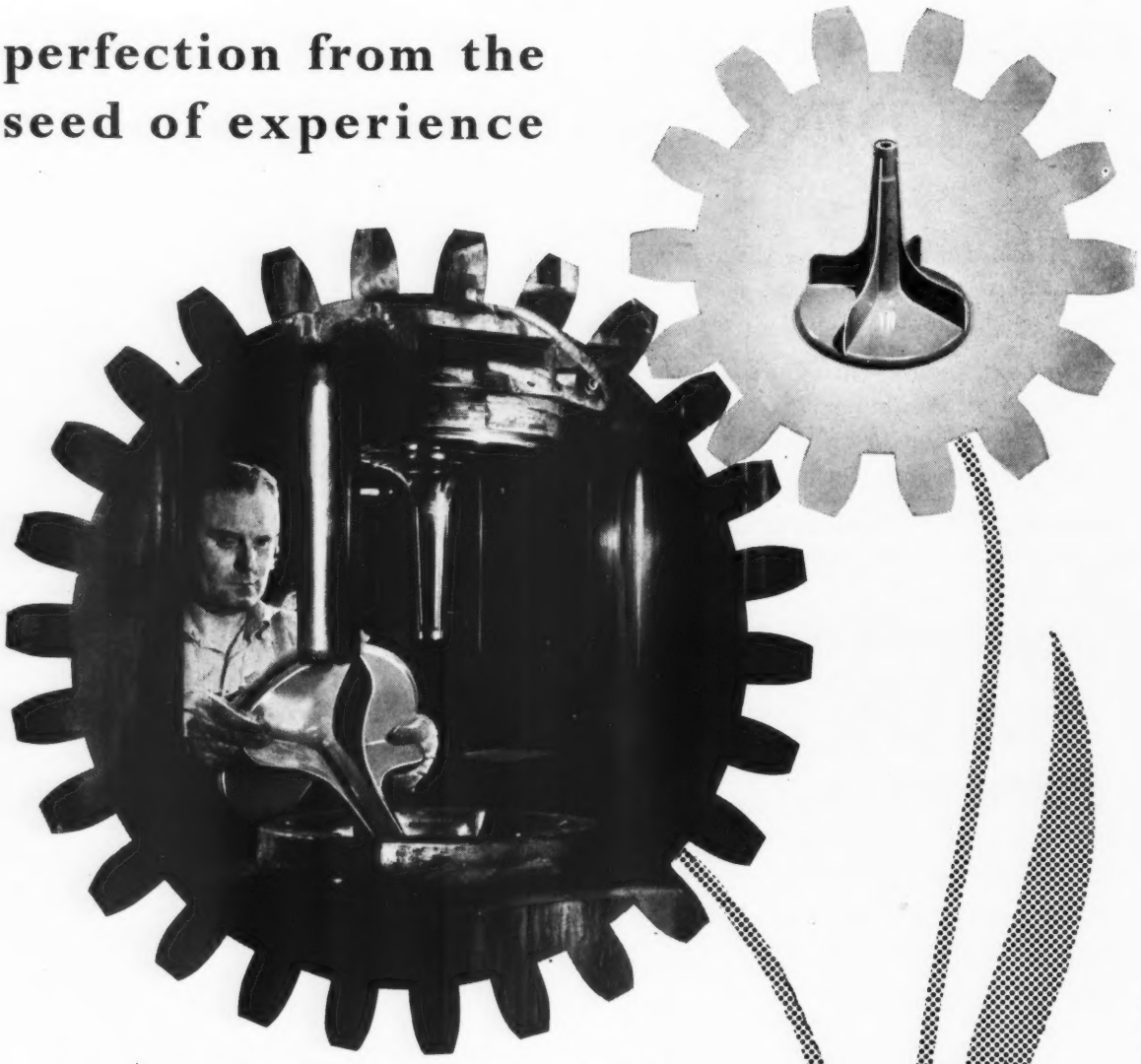

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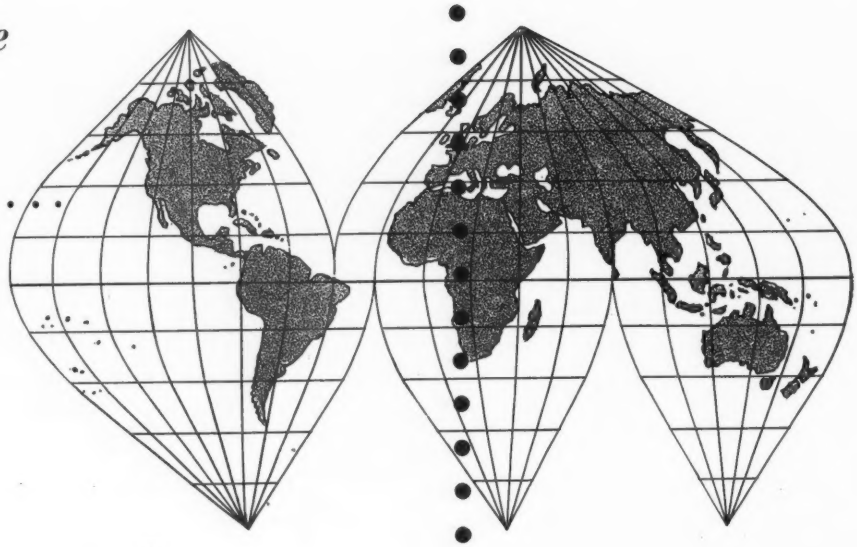

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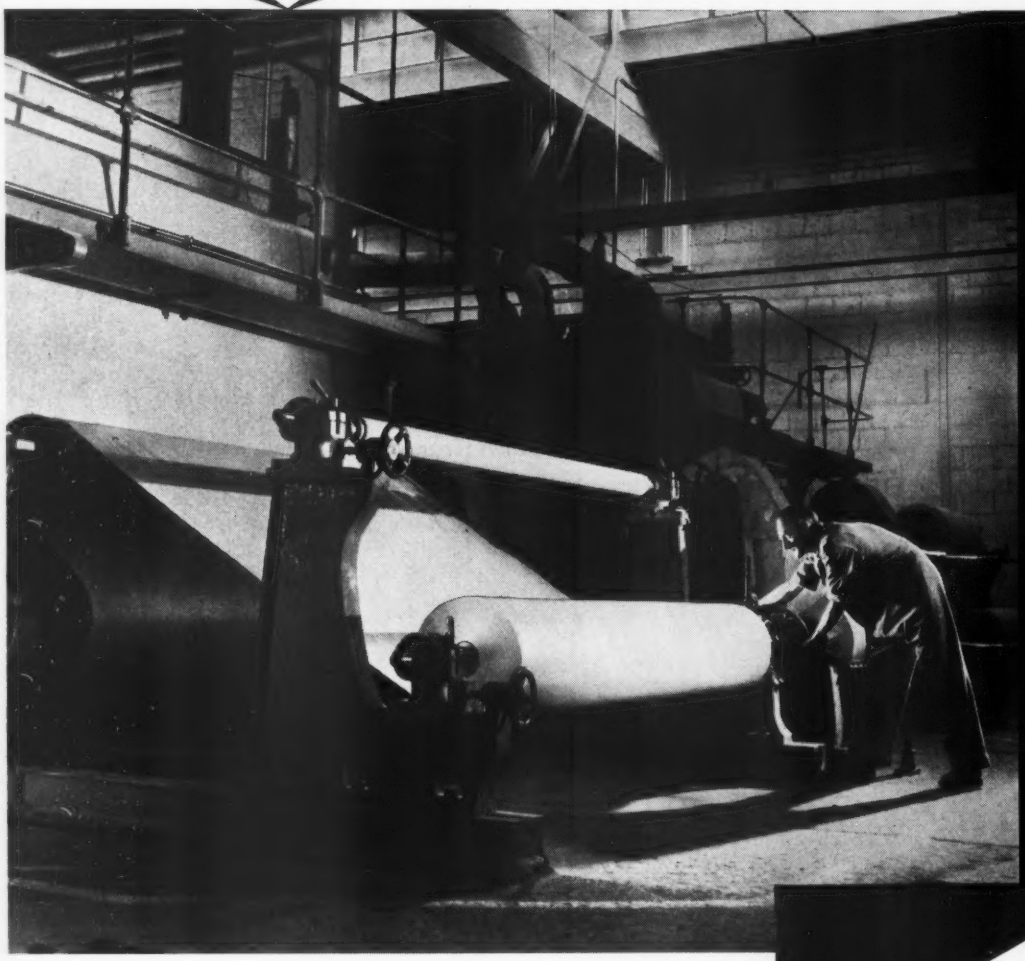
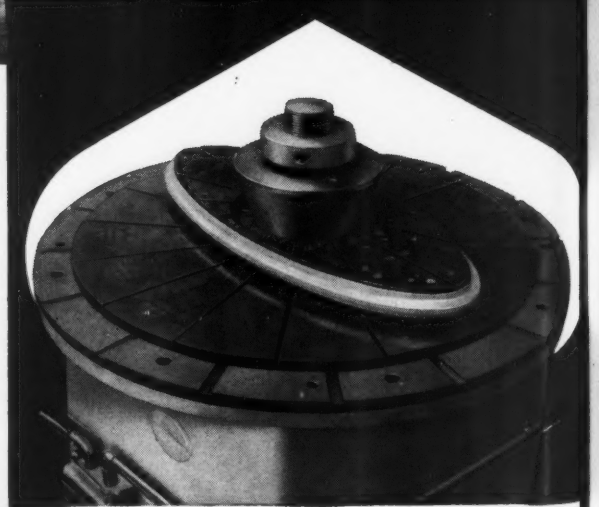


Different properties of BAKELITE *Laminated are emphasised in manufacture by varying the base materials. Asbestos, for example, increases heat resistance, fabric provides impact strength, and paper of various kinds are used for electrical insulation. In this photograph, paper is being reeled after passing through a large impregnator. It will subsequently be cut into sheets for laminating under heat and pressure.*

Hundreds of hours of machining time have been saved in aircraft, automobile and other factories by the use of BAKELITE Laminated for jigs and tools. Because of its easy machinability, it is used to make drilling, routing, and spindle moulding jigs, bending blocks, stretch-forming tools, profile gauges, and assembly fixtures. Its light weight is of great importance when large jigs have to be handled. The expanding jig shown is used for stretching metal ring sections to final shape and size. All the segments are machined from BAKELITE Laminated.

Expanding jig used in Engine Division of the Bristol Aeroplane Co. Ltd. Segments machined from BAKELITE *Laminated P.992.*



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Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED

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Cistern manufacture at the Witton Moulded Insulation Works of the G.E.C.

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Printed in England and Published monthly by the Proprietors, Temple Press Limited.

Annual Subscription Rate 34/-. Shorter periods pro rata

Advertisement and Publishing Offices:
Bowling Green Lane, London, E.C.1
Telephone: TERminus 3636

Editorial Offices:
27 Shaftesbury Avenue, London, W.1
Telephone: GERrard 4403

NP2

Table top for Goodearl Bros., Television cabinet for Bush Radio and Fuse carrier for J. G. Statter are all made from phenolic material. The serving tray is resin-impregnated paper with "Warerite" linen finish, giving hard service in Woolworth's canteens and many Service messes.

NATIONAL PLASTICS make them LARGE

Obviously we can't make large mouldings without large presses and a tool-shop to make large moulds, but there's more to it than that.

A large moulding is not just a small moulding blown up — far from it. Problems of material flow, temperature and pressure are all different and more complicated. That's why it is so much wiser to go to those who are making large mouldings all the time, as we are. The four articles shown here are all actual productions supplied in quantities to our customers. When you are thinking in terms of large mouldings ring Larkswood 2323 for practical advice and design assistance.

NATIONAL PLASTICS

NATIONAL PLASTICS (SALES) LTD. Sales organisation for BRITISH MOULDED PLASTICS LTD., Avenue Works, Walthamstow Avenue, London, E.4 . . . *LARkswood 2323*

Plastics

VOL. XX. No. 217 AUGUST, 1955

EDITORIALS

Education

WE are, it is acknowledged by the whole world, a highly literate nation and we have grown so because of the creation of schools during the past 500 years by kings and queens, by private philanthropists and organizations that saw good in their creation, and by successive Governments and local councils during the past 150 years.

Today with the exception of the Nuffields of our country, private philanthropy has almost disappeared and "philanthropy," so far as education and much else is concerned is deemed to be the business of the Government only. The reason is not far to seek for few men can now become wealthy, and bequests, donations, scholarships and foundations of any size are almost things of the past. The need for even wider and changed education however, has increased instead of diminished and if we are to exist at all in a world in which technology will reign supreme we must bestir ourselves.

In our May issue we published and commented on the report of the serious financial situation of the Plastics Industry Education Fund which for many years had remained static at an income of some £5,000 a year, that sum having been donated by about 70 of the 350 members of the British Plastics Federation. An appeal was launched in April to obtain an income of £10,000. If the figure of £5,000 was totally inadequate to satisfy the calls on the Fund, £10,000 is far from being an overwhelmingly large sum.

Yet the £10,000 was not reached. The result to date is about £7,000 which the Secretary of the Fund deems "encouraging." We do not, since it is apparent from the latest report that the increase has been obtained largely if not entirely from some of the 70 companies already subscribing, by asking them to double their subscriptions. Over 250 companies within the Federation have not subscribed at all, nor, we infer, have any companies outside the Federation.

Furthermore it seems strange to us that the Committee of the Education Fund which has been carefully fostered by the Plastics Institute has avoided appealing directly to the members of that body. There must be some students and young members who cannot afford to subscribe, but judging from the status of many of the over 25s in responsible and perhaps well-paid posts: directors, managers, chemists, physicists, engineers, sales staff, public relations officers, so many of whom attend regularly the Institute's functions, especially the annual luncheons and dinners, we should imagine that among the more than 2,000 members, many would help, if given a lead. at the rate of 10s. 6d. or a guinea a year—little more than the price of a few packets of cigarettes. If each of the plastics companies in the country donated at a rate equal to one-third of the annual wages of its charlady, the Fund could rattle up £50,000 in next to no time. In passing, we do hope that no individual, whatever his position, deems himself free from any moral obligation to subscribe, just because his company already does so.

Pure and Technical Research

SINCE few will disagree that we need more technologists there is also no need to stress our parallel need for more pure research and for more technological research. To give one particular case only, there is almost no greater urgency than to study the progress of polymerization which might tell us how far towards its "final position of rest" a so-called finished job has gone. We can give a fair estimate with thermosetting resins, but not with thermoplastic materials yet, and we know that monomer is still present in a moulded article made therefrom, and that polymerization continues for a long time after with resultant effect. American research is utilizing ultrasonic methods in its researches and is giving, at least interesting, results. As for technical research there are endless problems to solve, but one necessary piece of ad hoc research that seems to our astonishment to have been completely ignored concerns polyester resins. Our astonishment refers to the manner in which the discoverers and those who have since entered the field of such resin manufacture, swallowed, hook, line and sinker, the practice in the paint and varnish industry of using cobalt in the form of a soluble organic combination as an accelerator without learning that the paint industry very rarely, if ever, uses cobalt alone. Using cobalt alone invariably gives a surface hardness in a film while the bulk of the inside remains fluid. Generally the paint makers use a combination of cobalt and lead to give both surface and internal hardness in a short time. In the case of polyesters, lead would probably not be suitable since it tends to precipitate any available dibasic acids present and give a cloudy effect. Paint technologists have known this for years and some are now utilizing a combination of cobalt and cerium with very low cobalt content. Doubtless too, it might be found that the quantity of catalyst—the peroxide, could be diminished with benefit. We cannot view the presence of peroxides in excess other than with suspicion as being a possible source of degradation.

Sacred and Profane Statistics

FOR nearly 20 years we have urged the disclosure of the production figures of plastics—statistics which are important as a yardstick of our growth to ourselves, to the public, to financiers and indeed to the world at large. Among other independent viewers of the plastics scene who also urged publication was Dr. V. E. Yarsley. We were therefore delighted to listen to his recent Presidential Address to the Plastics Institute when he again referred to the subject.

It was not until well after the war was ended that we obtained some measure of satisfaction. Before that date all that British lecturers could talk about when describing the growth of the industry was to refer to American figures which were freely available and to British progress in astonishingly vague terms, such as "manufacture of plastics in Great Britain has increased 50% during the past 10 years." It all seems incredible now. There are, at long last, signs of movement and we welcome the declared desire on the part of the British Plastics Federation to supply the demand. The difficulties are great, for analysis of figures received from manufacturers is not easy if we want to know how the resins are used; the number of applications that "overlap" is very great, and some manufacturers do not give as much information as they could. Synthetic resins for textiles are never included in any

such statistics but synthetic resins in paints and varnishes and other film-forming compounds often are, frequently without disclosure of the fact.

This year, in consequence, we have an excellent example of how confusing indeterminate disclosures can be.

We had received from an independent source an estimate of total plastics production as near 200,000 tons. Our own calculations approximated this closely, no addition being made for synthetic resins in paints and varnishes. The Chairman of the British Plastics Federation at the annual luncheon in April gave the figure of 250,000 tons while *British Plastics* published their own estimate as 240,000. Now comes the statement by Dr. Yarsley that while Mr. Skan's figure "as far as can be ascertained included those plastics used in synthetic coatings" the latter figure did not.

Under such premises one or other of the figures must be wrong, for to put the difference of 10,000 tons as the quantity of synthetic resins used in synthetic coatings is fantastically wide of the mark. The census of production for the paint and varnish industry gives the quantities of paint based on synthetic resins and sold in this country as over 13,000,000 gallons, which would contain roughly 20,000 tons of synthetic resin. To this must be added those varnishes and lacquers also based on synthetic resins, namely, 1,913,000 gallons or about 8,600 tons containing 4,000 tons of synthetic resin, and the cellulose ester and ether varnishes and pigmented enamels containing some 10,000 tons of cellulosic compound. We have so far excluded those oil-bound distempers which are made containing synthetics and the new polyvinyl acetate and polystyrene emulsion paints. Vinyl Products, Ltd., disclosed last month that 20,000 tons were produced in their own factories alone in 1954. Far from being a mere 10,000 tons, a closer estimate of the quantities used would be over 50,000 tons.

Obviously it is high time that standardization in reporting production was made and for it international co-operation should be sought.

MOULDING POWDER AND SHOT

Cotton v. Synthetics

A recent note in the "cotton" page of the *Manchester Guardian* made me open my eyes very widely: "... The (U.S.) Department of Agriculture's target for the 1955 crop is 10,000,000 bales (a bale contains 478 pounds). ... The acreage for this production is 18,200,000 compared with 21,400,000 acres in 1954 and 46,000,000 in 1925. ... Consumption of cotton in the U.S.A. in 1954 totalled only 68½ per cent. of American fibre production compared with 84 per cent. in 1934. The Exchange cites these figures to show the extent to which cotton is losing ground to synthetics." After my visit to I.C.I.'s Terylene plant at Wilton in January I wrote: "No doubt it is somewhat foolish and perhaps rather difficult in the year 1955 to evaluate the implications in terms of costs, labour, space, geography, including changing climatic conditions, politics and world strategy, of a completely synthetic fibre factory, costing perhaps £15,000,000, covering a mere 30 acres but producing 10,000 tons a year, with the output of a similar area in the cotton field of the United States or Egypt or in the sheep farms of Australia. Quite foolish now, but it might prove more interesting, and even more important, to do so, say, in 1985." I can now, therefore, add the following.

Cotton yield = 265 pounds per acre.
Terylene yield = 730,000 pounds per acre.

◆ ◆ ◆

Art in Industry

I remember writing to the *Daily Telegraph* many years ago in answer to a somewhat pompous letter decrying the modern machine age and the absence of art in it. I thought there was a great deal of art if one looked for it, especially in tool-making, although it would be difficult to arouse any like emotion in somebody who knows nothing about engineering. All this comes to my mind again after re-reading A. G. MacDonell's "England, My England," for it contains the following: "Nay lad," said William, breaking into his broadest Yorkshire, "I'll never chuck the shop till the shop chucks me, and that won't be for many a year yet." He held out his two great thin hands and went on, with perfect simplicity: "I can make any machine in the world with these two. I'm a craftsman, lad, as good as any in the North Country. And it isn't only that." He laid one of his hands upon Duncan's sleeve and said with earnestness: "There's poetry in machines. You'll may not understand. But that's how I see it. Some folks like books and music and poems, but I get all that out of machines. I take a lot of steel and I put it into different shapes, and it works. It works. D'you see? It works as true as a hair to the thousandth part of an inch just as I made it and meant it. I'll go on making machines till my dying day, even if it's only toy engines for grandchildren."

◆ ◆ ◆

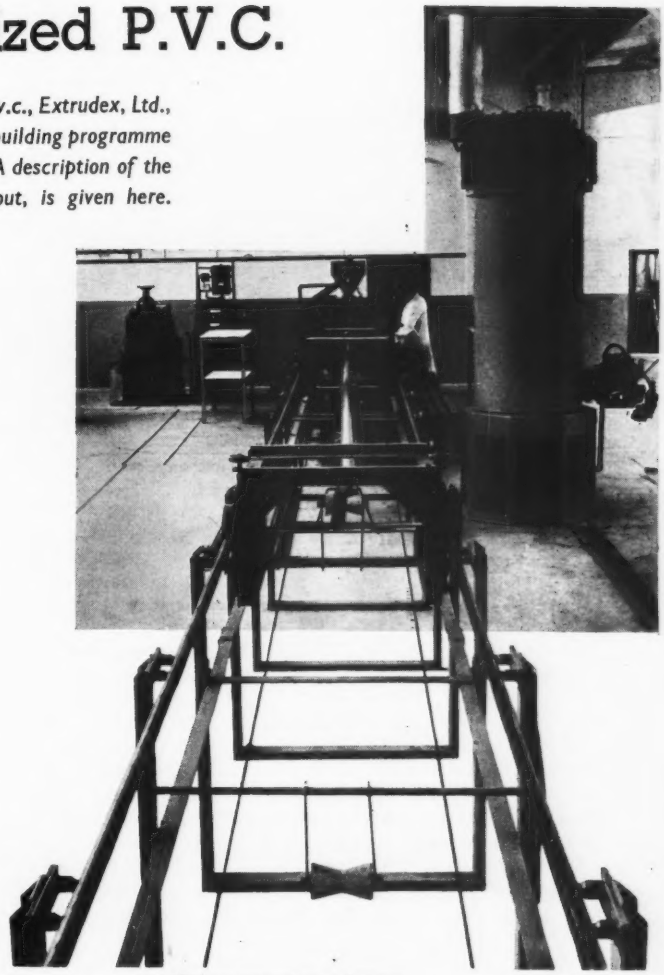
P.V.C. Table Tops

The small café table top began in France in the dark ages as marble surrounded by an iron casting. About the late 1920s the phenolic moulded top invaded the industry and today seems to share its position fairly equally with the laminated top, its brighter competitor. The latest sign that p.v.c. was also making a place for itself I saw a month ago in a hotel bar on the Riviera in a very striking and elegant fashion. Two colours on delicately embossed p.v.c. (about 20 thou. thick) were used, canary yellow and dove grey, both tables and chairs and their seats alternating in these colours to give contrast. The most interesting point about the p.v.c. was that the sheet had been stretched and pinned with ornamental "drawing pins"—underneath and invisible in the case of the tables and chair seats and at the back and visible in the case of the chair-backs, as can be seen in the photograph. The hotel manager was extremely pleased with them for they all looked as new after two years' wear and still showed no sign of deterioration even where the pins had been inserted.

DOGSBODDY.

Extruding Unplasticized P.V.C.

Specializing in the extrusion of unplasticized p.v.c., Extrudex, Ltd., have recently completed the first phase in their building programme at the new factory at Bracknell, Berkshire. A description of the plant, and the main types of work carried out, is given here.



Modern extrusion technique.

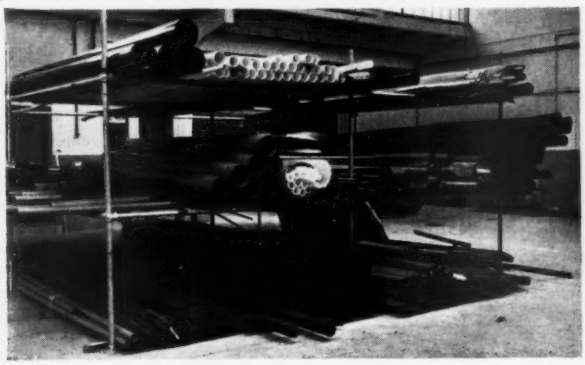
THE successful use of plastics in the majority of its applications has been a direct consequence of its inherent properties coupled with the technician's knowledge of the best methods of exploiting these qualities. As a natural consequence of this state of affairs, specialization is becoming a more prevalent feature in the industry. This is a healthy sign from both the consumer's point of view and also from the industry's. The consumer will have at his service a fabricator, by necessity, conversant with all the latest developments both in materials and fabrications; and with a practical knowledge of his material and its limitations the industry will benefit from the increased usage and wider application which the specialist must promote for his own interests. The market will obviously be smaller at first, but what it lacks in size will be made up in potential, and developments of this potential market will be made all the easier by the offer of a reliable and efficient service and knowledge of the product.

Unplasticized P.V.C.

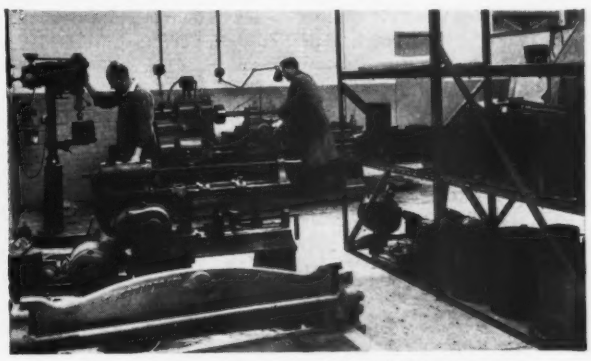
With these factors, and others besides, in mind, Extrudex, Ltd., Western Road, Bracknell, Berkshire, have entered into the extrusion field, specializing in the more difficult extrusion of totally unplasticized p.v.c. The biggest consumer of this piping at the moment is the chemical industry, where it is being considered, and in many cases adopted, for the transport of corrosive fluids. This is an exacting application and one where the raw material and the extruding have to be of the highest standards. To maintain these standards and to produce initially the right type of pipe for the job, Extrudex have attached to their shop a laboratory equipped for testing of unplasticized p.v.c. and other materials under different conditions. By means of random testing, a continuous check is thus able to be kept on production, besides the not-infallible sight and touch tests of the operator who is concerned primarily with actual production.

Machinery

The extrusion machinery which has been developed for unplasticized p.v.c. by Extrudex, Ltd., is basically the Windsor R.C.100 twin-screw extruder. Alterations have been effected incorporating screws and barrel of their own design. The die heads used are manufactured in a tool-room attached to the main factory, where all operations, from the building of the wooden model to the final assembly, are carried out. The one operation not done in the building is the application of the hard chrome finish, which is a standard for all the Extrudex dies. The take-off and cooling equipment has also been designed and built by this company for their own specific needs. The speed of the take-off is governed by the speed of

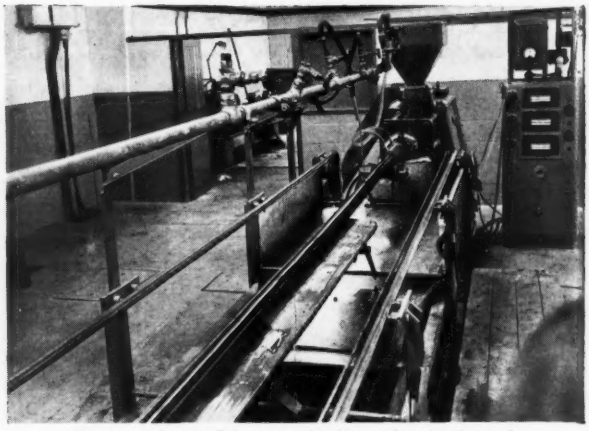


Storage frames for large and small-bore tubing.



The tool room where the majority of dies are made.

General view of main workshop.



Close-up of one of the extruder lines, showing here the production of rigid p.v.c. tube.

the extruder, the support of the tube being effected by wooden rollers, the drawing-off by means of a cable-driven railed trolley.

Material

Months of experiment went into the selection of the raw material which would give the best and most economic results for the chemical piping. The p.v.c. now being used is a compound based primarily on imported polymer, but with several other ingredients added by Extrudex themselves. It is totally unplasticized.

Unplasticized p.v.c. compounds need a relatively high percentage of heat-stabilizer content, because of the higher temperatures obtained during the extrusion process and the comparatively long time which the material remains in the extruder barrel. To facilitate the extrusion of such materials, an increase in the lubricant content or the incorporation of some waxes and fillers of a fine particle size have been tried with varying degrees of success.

The increasing popularity of unplasticized p.v.c. for chemical piping is due to its high resistance to corrosive attack, either by acids or alkalis; another factor, not so important but certainly worthy of mention, is its lightness as compared to that of steel. A certain resiliency gives it high strength with consequently a reduced risk of fracture.

Although chemical piping and unplasticized p.v.c. extrusions are the specialized products of Extrudex, Ltd., they have an equally competent set-up for the extrusion of other materials for other jobs. These include polythene, for water piping, and other uses where diameters of from $\frac{1}{2}$ in. to 12 in. are required; cellulose acetate tubing with a maximum diameter of $8\frac{1}{2}$ in.; and high-impact polystyrene tubing in diameters up to 4 in. The chemical piping is extruded, like the polythene, in diameters ranging from $\frac{1}{2}$ in. to 12 in.

Packaging Milk — A Problem and Possible Answer

A DISTURBING report has been published by Mr. S. Hallard, Chief Inspector of Weights and Measures to Cheshire County Council, in which he gives the results of an investigation into cases where glass has been found in milk distributed to schools. Mr. Hallard states "It requires little imagination to assess the seriousness of this problem when it is realized that the amount of glass found in bottles of school milk during these inquiries ranged from a teaspoonful down to minute splinters, so small that they were sucked up by schoolchildren through drinking straws. . . . During the course of these investigations it was found, in the vast majority of cases, that the rim of the milk bottle was chipped, and thus it was impossible to prove that the glass was in the milk when it left the dairy premises.

"There is no doubt that the milk industry is alive to the dangers involved and one can only hope that in the not-too-distant future an unbreakable plastic type of container will be marketed, if not for general use at least for delivery of school milk."

The Answer?

A novel milk carton made of polythene-coated Kraft paper was shown for the first time in Britain at the Royal Show.

The Tetra Pak carton, with its unusual tetrahedron shape, is the logical result of development work carried out by the parent Tetra Pak Co., Lund, Sweden, over the past 10 years. From actual working experience gained in Europe, where Tetra Pak machines are already installed, there is abundant evidence that this type of carton is hygienic in use, convenient and economical to handle in bulk, and costs less than any other one-way package on the market.

For milk and allied food products, the Tetra Pak offers outstanding advantages from the hygienic angle, as it is sterile at the moment of filling and retains milk freshness longer than conventional types of containers. Moreover, the polythene-coated and printed Kraft paper lets in much less light than glass and, in consequence, there is less loss of vitamin content.

Production of the pack is by the following operations:—

1. Polythene-coated paper is fed into the machine.
2. The paper is formed into a tube, the seam of which is heat-sealed. During its passage through the machine, the polythene coating is heated to sterilization point.
3. The paper tube is filled with milk to a constant level, the filling pipe ending below the surface of the liquid.
4. The tetrahedrons are formed and heat-sealed by pairs of electrically heated jaws operating under pressure.
5. The filled tetrahedron cartons are cut into separate Tetra Pak containers ready for distribution to retailers.

In close collaboration with the Plastics Division of Imperial Chemical Industries, Ltd., Tetra Pak Co., Ltd., have succeeded in developing a technique of coating with Alkathene that is 100% uniform throughout the reel.

Progress Towards Shorter Cure Times

Some notes on a new fast curing phenolic moulding material developed by Canusa Ltd.

IT is common knowledge that although the plastics industry, as Dr. Redfarn recently reminded us, has been built up on the solid foundation of the compression moulding systems and the moulding therewith of the thermosetting resins, it is also now common knowledge that thermoplastic resin manufacture has outstripped thermosetting resin production. Thermoplastics owe this ascendancy principally to the injection moulding machine which is a faster and cheaper method of moulding than that of the compression process. This obviously is not the sole reason for great quantities of thermoplastic resins are not injection moulded; in many instances they have expanded fields by virtue of their very physical attributes and these are quite unassailable by thermosetting resins. Nevertheless it is a truth that thermoplastic have "usurped" many jobs hitherto made in thermosetting resins merely on the basis that they are quicker and cheaper to injection mould in certain thermoplastics.

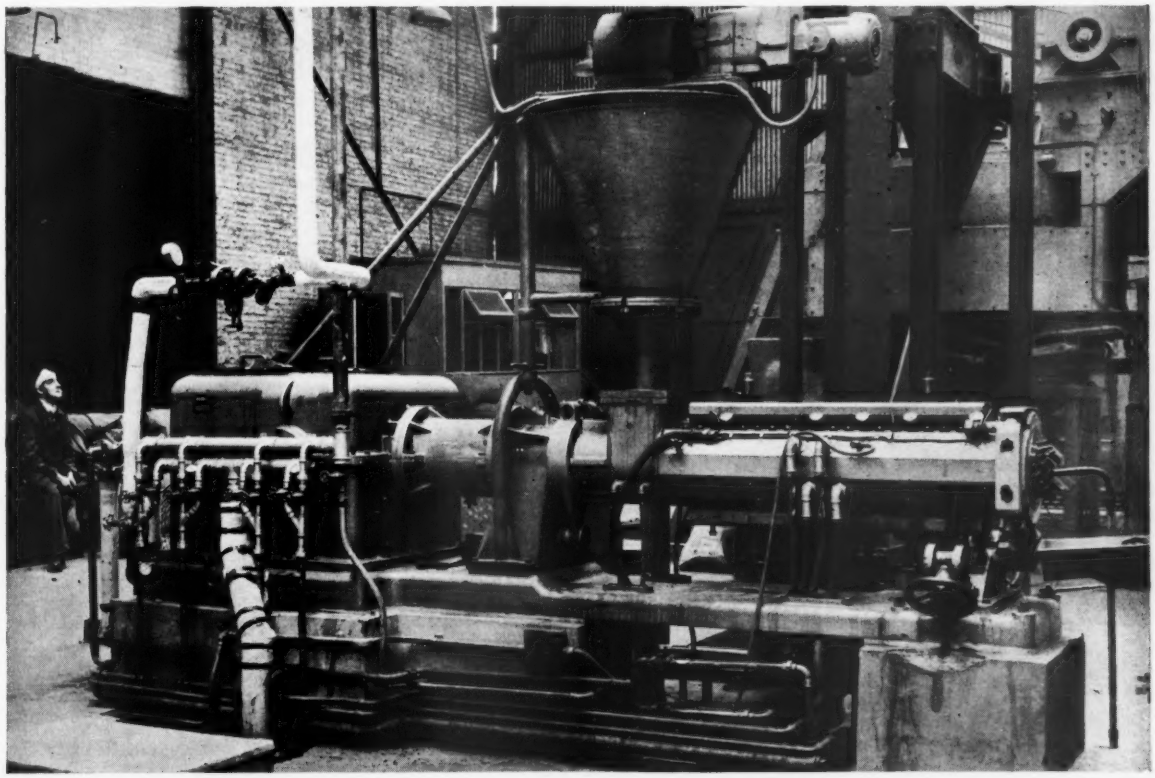
The problems inherent in the two types differ greatly. The thermoplastic types undergo no radical change in the injection machine, being converted merely from the solid to the fluid form by heat, and back to the original solid form after injection into the mould, by cooling. This heating, injection and cooling cycle is free from the complications set up by chemical change, the moulding cycle depending basically on the speed with which the change in state can be secured and is therefore a purely physical and mechanical problem.

The thermosetting resins require the continuance of a chemical process by heat and pressure and catalysts within the mould.

The two cases are therefore entirely different in complexion and it redounds considerably to the credit of the manufacturers of the thermosetting resins that curing time has improved greatly since they were introduced. Thus, whereas 30 years ago phenolic resins needed a curing time of about 5 minutes and more for a $\frac{1}{8}$ in. thick cross section the modern fast curing type takes 1 minute or under to cure at about 160° C. The urea-formaldehyde resins not only introduced fast curing but also better colours. Together with their low price compared with the cost of thermoplastics, their good heat resistance, low moisture absorption and other good physical and mechanical properties, the phenolic moulding materials have retained a large proportion of their original applications, where the aforesaid properties are desired in the finished moulding. They have lost ground, however, where colour or transparency is essential or desirable to cellulose acetate, polymethyl methacrylate and polystyrene, where electrical properties are of paramount importance to polystyrene, where physical strength properties are most important, to nylon and cellulose acetate.

In more recent years transfer moulding and high frequency pre-heating of powders have improved the situation in special circumstances only, while the ultra-rapid alkyd moulding materials while technically excellent have by no means won universal approval because of cost.

It is therefore of considerable importance to note the arrival upon the scene of a phenolic moulding material which while apparently no different basically in chemical construction yet so far as our examination goes, appears to ensure by its suitable physical condition, a curing time considerably



Production of new phenolic moulding material by Canusa Ltd. Note the modern "Ko-Kneader" mixing plant in foreground.

less than that of the normal type. It would seem obvious from the foregoing that such an advent would once again sway the pendulum away from thermoplastics to the phenolics type where such changes merely take place on the point of cost.

The new moulding material is being produced by Canusa, Ltd., in a plant laid out for continuous flow production and includes a "Ko-Kneader" (described in our November, 1954, issue) which occupies what may be called a key point in the flow-sheet of the process. At this point and until additional data are obtained regarding physical and mechanical tests on mouldings produced therefrom, it may be sufficient to give some comparative results of tests carried out according to B.S.S.771 under conditions of varying curing times.

We are grateful to Mr. E. Schneider, manager of the plastics division of Canusa, Ltd., and Mr. D. Brooks, chief chemist of the same company, for making available the following test information.

(1) The specially processed phenolic resins embodied in the new moulding powder appear to give faster cures. On the cup test, a saving of 10 sec. has been confirmed in hundreds of tests, this means 10 sec. on 47 sec. (excluding flow time), i.e., 21.2%, or 10 sec. on 62 sec. (including flow time), i.e., 16.1%. If the complete cycle is assumed to be 80 sec., the actual saving under cup test conditions would be $\frac{10}{80} = 12.5\%$, or in lifts per hour 51.5 against 45.

On the disc test it is felt that a safe comparison can be made between a cycle of 80 sec. as a minimum for standard material with 65 sec. for the new material, a saving of 18.7%.

On the experience in actual production it may be safe to assume that cycles can be reduced, say, from 3 min. to 2½ min. in other words, an increase from 20 lifts to 24 lifts. The manufacturers have no doubts, however, that further experience will show that the above figures are on the conservative side. But even on these assumptions, according to the calculations of Canusa, Ltd., savings in works cost of the complete article would amount to between 5% and 10%. This may not sound very impressive, but in practice it makes an enormous difference, as it is automatically representing a corresponding increase in output without adding equipment and labour.

(2) The company is of the opinion that the resins it employs are of higher purity and their performance is more reliable. Cure is more even, and gassing is reduced to a minimum. This has a certain effect on the rate of rejects, and this is an additional factor in reduction of the works cost.

(3) All the tests have shown a marked and practically constant increase in impact strength. It is assumed this is due to the different method of compounding, which enables Canusa to obtain efficient impregnation without destroying the fibres of the filler. The impact figures have been given as 0.19 to 0.21 full pounds, against 0.10 to 0.12 on equivalent materials. Fabric-filled compositions have not yet been tested, where the difference should be still more marked.

Appearance of Mouldings at Different Cure Times

Tool .. .. .. 5-in. diameter × ¼-in. disc—open flash.
Temperature .. .. 163°–164°C.
Pressure .. .. 20 tons.

No breathing or dwelling time was allowed.

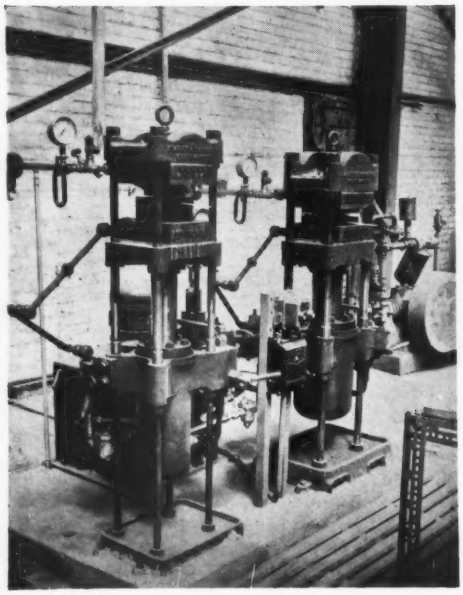
Time (excluding flow time)	Standard powder	Canusa powder
30 sec.	3–4-in. diameter blister Heavy gassing	1-in. diameter blister Light gassing
40 sec.	Surface blistering	Good finish
60 sec.	Slight blistering	Very high quality finish
75 sec	High quality finish	Very high quality finish

Moulding Cycle Times

Tool .. .. Cup BSS 771 flow test.
Temperature .. .. 162°–163°C.
Pressure .. .. 10 tons.

	Standard powder	Canusa powder
Flow time	15 sec.	15 sec.
Minimum times to produce perfect mouldings	47 sec.	37 sec.
Total cycle times	62 sec.	52 sec.

Rigidity and appearance of the moulding after a 52-sec. cycle showed the Canusa moulding to resist deformation when hot, immediately after withdrawal from the mould, and the standard powder moulding to be readily deformed and to have blisters on the base and sides, under similar conditions.

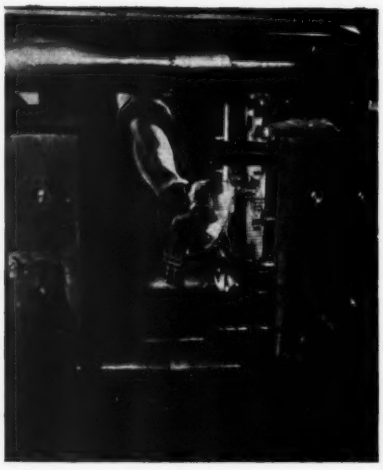


(Below) Cups and discs produced on the Bradley and Turton compression machines (left) using the new moulding material.

The Designer

The Toolmaker

The Moulder



The Mould

Mould Assembly

This page shows some of the fine photographs which have been taken by Walter Nurnberg, F.I.B.P., F.R.P.S., for The General Electric Company Limited, by whose kind permission we are permitted to reproduce them here. Depicting some of the people and the work they do in the production of plastics moulding, Walter Nurnberg has taken photographs which, besides showing clearly the particular operations, bring artistic composition into the picture.

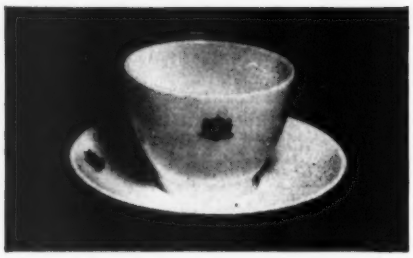
The subjects chosen are not novel, being familiar to all plastics moulders, and yet they have taken on a new and, if such a word can be used in this respect, romantic flavour.

The Fitters

Testing

Finishing

Decorated Tableware Continued



Made by Ranton and Co. Ltd. for the Pullman Co. The insignia is embedded integrally into the melamine by the "double-curing" process.

FOR the past year or so we have given some publicity to the need for decorating plastic tableware—a practice which is so rare as to call for delighted astonishment when it is encountered. We are raising the subject again and we make no apology for doing so, because we believe it to be eventually the logical sequence of events that have been taking place during the past 25 years or more, since the first urea cups and saucers appeared (we are fairly certain that experimental samples of dark red and dark green phenolic cups were also produced then and were lost in the demand for pastel shades. It is, perhaps, an interesting comment here that there is now a demand for dark-coloured ware in porcelain and china-ware—deep browns and reds for " cottage " ware and brilliant black and dark blues and greens for the " sophisticated "!) We are also raising the subject again for another reason—we have received an example of a plate and a saucer decorated with a colourful transfer protected by a sprayed and stoved lacquer from Axon and Harrison, Ltd., of Jersey, Channel Islands. We shall refer to this later in these notes.

Undecorated Plastic Ware

The history of the plastic cup, saucer and plate, as we indicated above, began 25 years ago or more and found its niche in the picnic set, where lightness was possibly an advantage, but where almost complete absence of breakage under very carefree conditions, was of paramount importance. The china cup and saucer has been almost totally ousted in this field. This process of replacement has been carried into the caravan—a form of weekly relaxation and even permanent holidaymaking that is spreading and having a strong effect on the habits of our people and, incidentally, on their clearer understanding of the value of plastics in general and of plastic tableware in particular. If there is one characteristic of the plastic cup that the public is acutely aware of more than any other, it is its resistance to breakage, which, in a world in which the cost of living mounts steadily, reaction against chinaware has resulted in the plea: " Can't we have plastic cups with the hardness of china? "

The modern story of plastic ware is seen also in the air liner, where lightness is, perhaps, as important as non-breaking qualities; in canteens; in the new holiday camps; and in railway trains and station buffets, where breakages of china reach formidable heights and make their serious imprints on overheads. (It is authoritatively estimated that British Railways lose 10,000 cups per day!) In spite of the so far unavoidable defect—that of eventual staining—the economic saving by using plastic tableware has proved outstanding.

Decorated Plastic Ware

If we are sure that the overriding advantage of resistance to breakage will carry plastic ware into wider fields, it seems axiomatic that at some future date a more concentrated attempt will be made to provide decoration, just as decorated pottery followed the first unadorned forms. Nobody, for example, is unaware of the large market awaiting well-designed and " permanent " motifs on children's ware, which may well be the starting experimental point for such work. Nor can it have escaped notice that the plastic flowerpot or, rather, flowerpot holder, has definitely secured a niche in this field after many attempts. No moulder, however, has, to our knowledge, attempted to apply decoration to them.

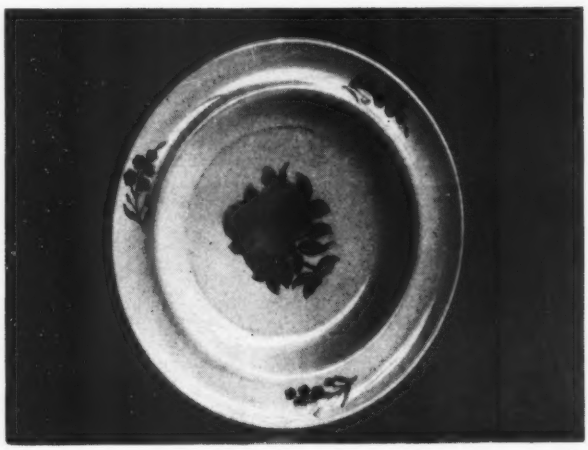
The only technically successful attempt to provide a decoration on a moulding has been the result of the work of a Swiss company, Ornapress A.G. of Zurich, whose " transfer " process we have publicized in this journal from time to time. To date we know of three moulders only in this country who have seriously examined the process, and of one moulding company only that has reached the point of production.

Admittedly the process is not one of simple moulding, for the integration of an applied resin-impregnated " transfer " into the surface of the cup or saucer entails two " curings " which, to preserve flow of production, may mean a separate press for the second cure and a dust-free, exceptionally clean section of the factory. Obviously, too, the cost of the finished article rises, but there is no doubt in our mind of the greatly enhanced value of the mouldings.

Alternative Process

An alternative process, which we suggested in the pages of this journal, bears some resemblance to that long carried out by the porcelain and china industry—the painting by hand or imposition of a transfer followed by a super-imposed protective glaze. In the field of decorated plastics this would presuppose a glaze of varnish

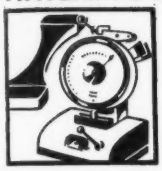
(*Continued on page 284*)



Left, Melamine plate: right, urea saucer with transfer decoration sprayed with synthetic resin lacquer and stoved. Axon and Harrison, Jersey.

World's Industry Employs Plastics

MATERIALS and TESTING



Testing plastic-bonded material.—A non-destructive testing device for plastic-adhesive bonded material has been developed by Stanford Research Institute. To check the perfection of the bond a vibrating piezo-electric ceramic probe connected to the meter is held against the sandwich surface. The electric response indicates a good or bad bond between metal and adhesive.
(*Mechanical Engineering*, 1955/June/519.)

Synthetic rubber for hydraulic fluids.—H. C. Crossland enumerates the basic types of synthetic polymers which are suitable for the hydraulic fluids at present in use. These are mainly of the fire-resistant type.
(*Machine Design*, 1955/May/236.)

Polysulfide liquid polymers find use for sealing flexible moulds and patterns, for modifying epoxies and as leather impregnants.
(*Materials and Methods*, 1955/May/110.)

New fire-resistant plasticizer.—Celanese Corp. of America announces that Celluflex CEF gives unique fire-retardant properties to a variety of moulded and extruded plastics and surface coatings.
(*Wire and Wire Products*, 1955/June/711.)

New epoxy-bonded mica insulation.—Improved properties are claimed for a new insulating material of reconstituted mica with epoxy resins. The special properties are enumerated and some case histories cited.
(*Materials and Methods*, 1955/June/112.)

Epoxy-furane blends.—By blending epoxy resins with up to 40% of a furfural-ketone resin, the cost can be reduced to less than 65 cents/lb. while maintaining the original physical properties.
(*Materials and Methods*, 1955/June/102.)

Plastics soluble in water only.—Two styrene resin modifications are insoluble in practically all organic solvents, but soluble in water. The resins are suggested for tackifiers, dispersants, thickeners and flocculants.
(*Materials and Methods*, 1955/June/178.)

Acrylic plastics.—A data sheet gives physical, mechanical, electrical and fabricating properties for acrylics from moulding powder and of cast resins.
(*Materials and Methods*, 1955/June/137.)

High-strength nylon has a high degree of mouldability and allows extrusion of transparent and translucent films as well as moulding of larger parts with thicker sections free of voids.
(*Materials and Methods*, 1955/May/108.)

Foamed plastics make strong core materials.—A new foamed phenolic resin "Corfoam 11" can be used for cores for metalworking dies, as insulating or sound-proofing material, etc.
(*Materials and Methods*, 1955/May/107.)

Plastics sandwich panels, of low cost, are described by K. Rose. The panel, composed of a foamed polystyrene core faced on both sides with glass-fibre reinforced polyester sheet, is strong, light in weight, non-warping, moisture proof and corrosion resistant, with good fire retarding and thermal insulating properties.
(*Materials and Methods*, 1955/May/150.)

PROCESSES : MACHINERY

Finishes for Plastics.—J. B. Campbell has compiled a manual on paint, ink, metallic and other coatings used on plastics. The manual gives the product designer information he needs for the intelligent design of plastic components.
(*Materials and Methods*, 1955/June/119.)

Epoxy resins for metallographic mounting.—Since neither heat nor pressure is desirable, casting resins of the chemical setting type such as Bakelite C 8 Resin BR 18774, Shell Epon No. 828, Armstrong C 4 Adhesive proved successful and could replace almost all other mounting methods.
(*Metal Progress*, 1955/June/109.)

Plastic bonds carbide to steel.—Through brazing, a thermal strain is caused which may lead to cracking. With an epoxy adhesive bonding can be done at 250 to 300° F. and results in a satisfactory join.
(*Metalworking Production*, 1955/May 6/813.)

INDUSTRIAL APPLICATIONS

Plastic tooling.—The Budd Co., Philadelphia, has established a large reinforced plastics department for dies, jigs, fixtures and models utilized in the production of automobiles and railcars.
(*Automotive Industries*, 1955/July 1/52.)

Epoxy tools.—Light weight, ease and speed of preparation have led after J. Delmonte to a rapid increase in use of these plastics. For instance a specially formulated epoxy of great flexibility is used as a tube-bending mandrel.
(*Tool Engineer*, 1955/June/117.)

Nylon-coated metal parts.—A new coating process makes it possible to cover metal parts with nylon coatings of 0.010 to 0.020 in., for instance, by dipping. In this way the good frictional characteristic of nylon and its wear resistance are combined with the better dimensional stability of metals.
(*Materials and Methods*, 1955/June/92.)

Repair of thermoplastic cable jackets.—Defects in a cable jacket can cause serious operational difficulties. Repair methods using hot gas welding are described. The method was first made known in 1937 and at present a number of different torches are available.
(*Wire and Wire Products*, 1955/June/678.)

Plastic protecting fibres.—E. Stutz surveys the application of plastic films in the drawing of metals, in particular during deep drawing and enumerates the technical requirements.
(*Werkstatt und Betrieb*, 1955/May/259.)

Silicones.—Technically, they represent a unique union between organic and inorganic substances, and have led to new oils, greases, rubbers and plastics.
(*McGraw Hill Digest*, 1955/July/11.)

MISCELLANEOUS USES

All-plastic truck body.—A milk delivery truck body has top, bottom, sides, and interior lining of a polyester-glass-fibre laminate. The body of the delivery truck is produced as two large mouldings with framing and fender well integral with the skin.
(*Automotive Industries*, 1955/July 1/63.)

Plastic lining for sewer.—One mile and a quarter of 8½-ft. semi-elliptic sewer is being constructed in Los Angeles with polyvinyl chloride plastic lining.
(*Engineering News Record*, 1955/March 17/42.)

Uses of vinyl plastics.—New developments in particular for motorcars are discussed. Those include backing materials for door panels, coating for rubber floor mats, window stripping materials, etc.
(*Tool Engineer*, 1955/June/202.)

Application of vacuum-formed plastics.—C. H. Bagen gives hints how to design vacuum-formed parts made from sheet plastics.
(*Machine Design*, 1955/May/149.)

Luminous ceiling.—An indirect illumination of a ceiling in an assembly hall has been achieved by plastic plates. In connection with 25 local lamps at the work benches, a shadow and blendfree illumination has been obtained.
(*Factory Management and Maintenance*, 1955/1/152.)

Neoprene tarpaulin.—Nylo-Tarp is a combination nylon and neoprene tarpaulin material combining high strength with resistance to weather and abrasion. Stated to be lighter than conventional material.
(*Autom. Ind.*, 1955/June/87.)

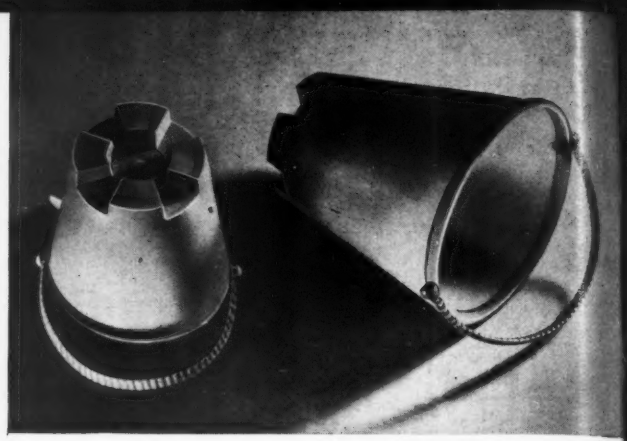
Plastic bodies for Chevrolet sports cars.—Full description of the processes for producing the body of the Chevrolet two-seater sports car of glass fibre laminated material.
(*Machinery (Lond.)*, 1955/May 20/1076.)

PLASTICS
IN THE SERVICE OF MAN

A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

58. Plastics on Holiday - I

A list of trade-marks and companies mentioned in this review, with full names and addresses, appears on page 289



(Above) Castellated sand buckets moulded in polythene by Airfix Products Ltd. are an essential on the beach.

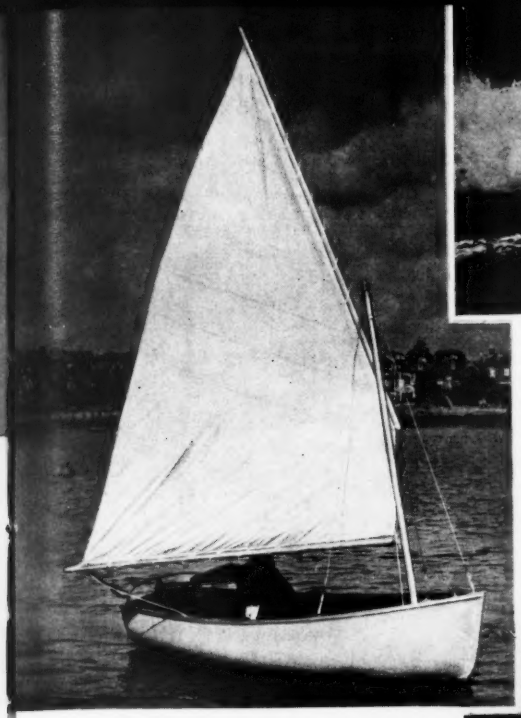
(Above) Picnic essentials are the Isovac jug and cups moulded in paper-filled urea by Universal Metal Products Ltd.

(Left) For those who seek the sun in foreign climes, a welded p.v.c. passport wallet by U.K. Plastics Ltd.

(Left) Even the most optimistic will take a mackintosh like this all-sewn vinyl garment made by P. B. Cow & Co. Ltd.

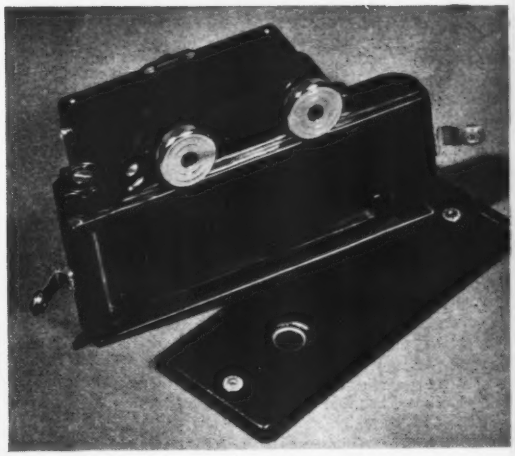
(Above) The sun must shine sometimes and these plastics-framed sun-glasses made by E. R. Holloway Ltd. are both decorative and useful.

(Left) Your suitcase may be, like this, covered in Tygan material (*Plastics* 1949/July/348).



(Above) Or sailing in a dinghy with a polyester glass fibre hull made by The Southampton Launch and Boat Co. Ltd.

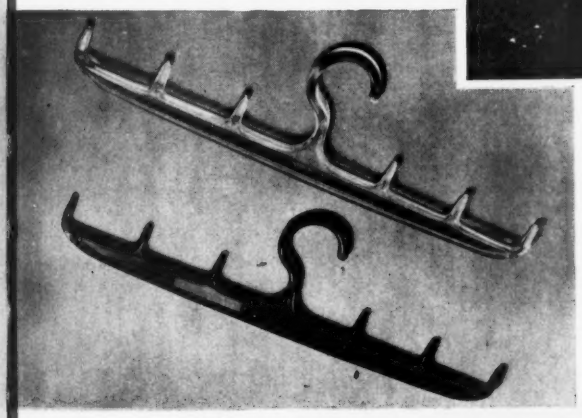
(Left) Round the bay in a "Moonfleet" speedboat with a Cellobond polyester resin, glass fibre hull.



(Above) A record of your holiday taken by this stereoscopic camera moulded from plasticized Scarab by British Plasticon Products Ltd. for Coronet Cameras.

(Below) For the air traveller the "Pak Flat" travel grip made from cloth backed plastics by P. Pell and Son Ltd. (*Plastics* 1951/Aug./230).

(Right) A centre shaft putter for the golfing enthusiast with a moulded phenolic head (lead weighted) by Kent Mouldings.



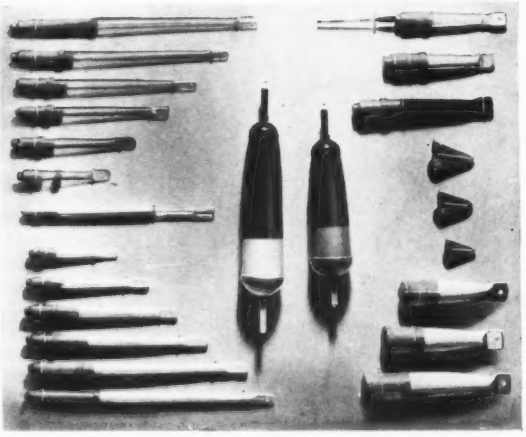
(Above) Skirt hangers moulded in polystyrene by J. F. Kenure Ltd. and distributed by Initial Plastics Ltd.

(Right) Attractive beach bags made from cloth reinforced p.v.c. by Dermide Ltd. (*Plastics* 1951/Aug./231)

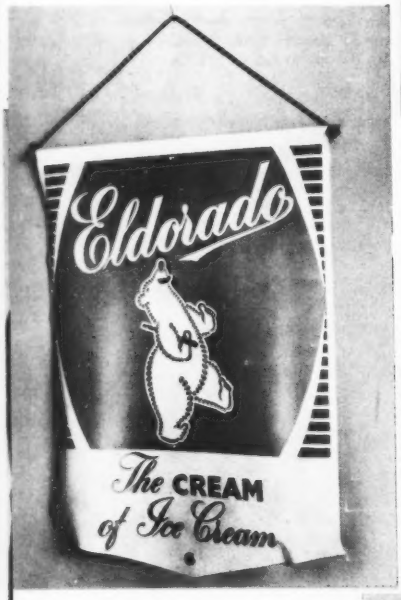
(Above) For the evening; articles incorporating Vybak p.v.c. Bective shoes, handbag by Einstein Mfg. Ltd. and belts by Sheldon & Sons Ltd.

(Left) A yacht brooch to go with your tan, moulded in polystyrene by Injection Moulders Ltd.

(Below) Your own paddling pool or a sail on the briny in this p.v.c. "boat" made by Cascelloid Ltd.



(Left) Fishing floats for the amateur and professional, made from Xylonite by the General Celluloid Co., Ltd.



(Above) An ice cream banner, printed on B.X. Plastics Ltd. p.v.c., by Delmore Ltd.

(Above) Beach bag handles moulded in cellulose acetate by Injection Moulders Ltd.

(Left) B.O.A.C. travel bag made in Velbex by the Helos Supply Co.

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Plastics Manometers

SIR,—Could you please let us have the name of any supplier who could supply us with plastic tubing (15 mm. bore) suitable for use in vacuum manometers. Most plastics seem subject to degassing when used in this application. Bubbles are formed in the mercury or in liquid above it.

GLASSHOUSE CROPS RESEARCH INSTITUTE.

Worthing Road,
Rustington,
Sussex.

Australian Inquiry

SIR,—We have received an inquiry from clients in Melbourne, asking us to obtain on their behalf offers of small Perspex swinging tickets, which can be attached to garments, with certain wording on these plain, flat-finished tickets, and they also require one or two Perspex signs which can be stood at the bottom of the floor of a shop window, also to tie up with the garments concerned.

F. J. HAWKES AND CO., LTD.

Finsbury Court,
Finsbury Pavement,
London, E.C.2.

Sealing Rings for High-speed Grinders

SIR,—We should be glad if you could let us know the name of the manufacturers of sealing rings of soft foam plastic, as used for preventing ingress of grinding dust around the spindles of high-speed grinders.

Our inquiry is prompted by an article we read in *Machinery*, February 12, 1954, page 325, on the Wagner high-speed grinding spindle, in which reference is made to such a sealing ring as mentioned above.

REILLY ENGINEERING, LTD.

Pilot Works, Walnut Tree Close,
Guildford, Surrey.

Foamed Plastics

SIR,—I shall be obliged if you can advise me if there is a plastics material available that would be suitable for the limbs of fur fabric-covered soft toys. It would require to have the feel and weight of Kapok filling and would need an 18-gauge wire core. I had thought of latex foam rubber but thought that it would be rather expensive.

H. A. BULL.

31 Branksome Dene Road,
Bournemouth, Hants.

Low-Temperature Moulded Components for Vehicles

SIR,—Going through *Plastics* carefully, to which we have subscribed for some years, we learn that you give full explanations and replies to the people interested in plastics.

May we ask, therefore, for your suggestions in respect of plastics for cold moulding for the manufacture of automobile, bus and trolleybus accessories.

We have heard that polyester resins have already been used in automobile construction and have approached one resin manufacturer on the subject. Can you tell us, however, whether another resin could be also applied to cold moulding.

We shall much appreciate if you will submit us, together with your information, the name of the firm we could contact for required material.

"HEMPRO."

Gospodar Jovanova 35,
Belgrade.

Agency Inquiry

SIR,—We beg to inform you that we are interested in the import as manufacturers agents on commission basis, for the following materials: Polystyrene, polythene, cellulose acetate, polyvinyl chloride, cellulose acetate and phenolics.

H. A. DOSTIS.

Rue Metonos No. 2,
Athens,
Greece.

Polythene Tubing for Water Supply

SIR,—We have been requested by our Malayan Branches to investigate sources of supply of polythene tubing for water supply and are writing to you for assistance concerning the names and addresses of suitable manufacturers.

JAMES WARREN AND CO., LTD.

Hopetoun House 5,
Lloyd's Avenue,
London, E.C.3.

Small Containers

SIR,—We are looking for a supplier of very small plastic or Perspex containers to use in packing assortments of small pins and springs and possibly other lines.

We have seen some about the size of a matchbox and a little bigger which would suit our present purpose. Can you help us to locate a supplier or manufacturer of same?

C. O. TILNEY, LTD.

9-11 Holywell Hill,
St. Albans, Herts.

Expanded Plastics

SIR,—We are highly interested in any new development of insulation for high and low temperatures, and it was, therefore, very encouraging for us to read in the June issue of *Plastics* that plastics are entering this field.

On page 192 of the just-mentioned edition we found a reference to plastics insulating material in the summary of the Convention paper entitled "The Technology and Uses of Polyurethane Foams," by L. N. Phillips. It is said, there, that it is also used for lightweight insulation material.

We would be greatly indebted to you if you could name or forward our request to any manufacturer who is in the business of producing plastics for insulating purposes.

COMUNICACIONES DE VENEZUELA S.A.

Caracas,
Venezuela, S.A.

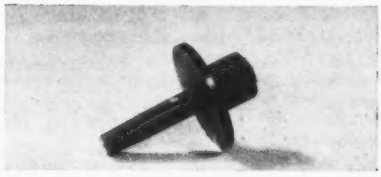
Polythene Plug

SIR,—Would you give us the names of likely suppliers of polythene plugs. Our use of this plug would not be very great, and it would not be a proposition to have tools specially made.

We are, therefore, seeking a maker who has these tools in existence.

THE DUBARRY PERFUMERY CO., LTD.

Goldstone Laboratories,
Hove 4, Sussex.



Polythene plug required by Dubarry Perfumery Co. Ltd.

Swedish P.V.C. Compounds

SIR,—Manufacturers in Sweden of p.v.c. compounds are anxious to get in touch with U.K. users. The compounds produced are intended for primary cable insulation, jacketing of electric cables, as well as for general extrusion, e.g., for hoses, belts, profiles, etc.

Inquiries should be addressed to the Elof Hansson Agency, Ltd.

ELOF HANSSON AGENCY, LTD.

4 Carmelite Street,
London, E.C.4.

The Hanover 1955 German Industries Fair

A report on some of the German developments shown at this Fair

By P. Grodzinski

ABOUT seventy firms of the chemical and plastics industry gave, in Hall 6, a cross-section of their manifold production programmes, but there were a number of other firms widely distributed over other halls, which showed plastics products. The industry producing plastics machinery was concentrated near the entrance of Hall 4.

The three main German producers of plastics had large stands. The Farbwerke Hoechst, and Badische Anilin and Soda Fabrik have recently taken over the production of polyethylene employing the methods of Prof. Ziegler and the preparations for large-scale production are said to be now almost completed. Polythene tubes are of particular interest in the new housing programme.

Polystyrole masses have been further developed, these materials can now be supplied in practically all colours. Containers, bowls and housings can now be produced economically in a polystyrole of high-impact strength. The foam material Styropor has found wide application for packaging purposes and for refrigerators. Cast resins of low flammability are of particular interest for the building and engineering industries.

A car body, made in two longitudinal halves, for a modern three-wheeler invalid carriage was also shown by BASF (Fig. 1). It is made of a glass fibre and resin laminate and so designed that the driver and others can leave and enter the car by opening a door at the front. A low weight, good sound damping, high mechanical strength (3 mm. thickness as compared with 1 mm. thickness in the case of steel) and high weather resistance are claimed. No attempt is at present being made to compete with the steel bodies made by mass production methods; the weekly production is about 17 bodies which are produced from wooden moulds.

Two motor boats were shown, made of glass fibre and resin (Palatal) laminate. The motor boat with a length of 17 ft. and a beam of 5 ft. 3 in. is said to reach a speed of 25 m.p.h. with a 28-h.p. Volkswagen engine and of 33 m.p.h. with a Porsche engine of 48 h.p. The weight of the boat is 750 lb.; and it can carry up to five persons.

The Farbenfabriken Bayer A.G., Leverkusen, have developed a highly-flexible material on an isocyanate basis which is sold under the name Vulkollan; this material combines physical properties hitherto not reached by an individual material and can be used for machine parts in compression as well as a most useful belt material. Table 1 gives a survey of some physical and technical properties. The material can be cast in special moulds with a shrinkage of 1.5% to 2%. It can be machined mechanically but the cutting edge must be sharp and the wedge angle small.

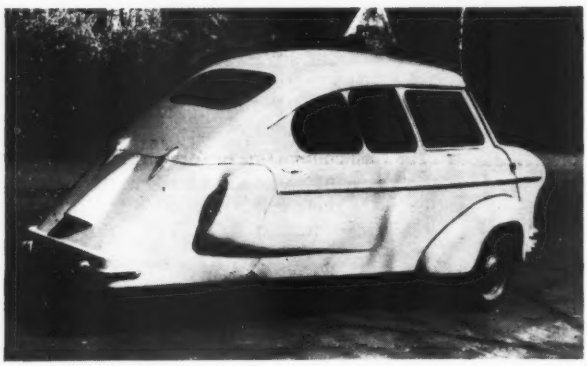


Fig. 1. Invalid carriage with glass reinforced plastics body, shown by Badische Anilin and Soda Fabrik.

Table 1.—Properties of Vulkollan

	Type 1800	Type 3000
Specific gravity	1.25	1.26
Rupture test (ring sample) kg./sq. cm.	350-400	200-350
Elongation %	600-700	450-500
Elastic modulus at 300% strain kg./sq. cm.	60-80	140-160
Permanent elongation by 100% strain for 7 hours %	7	–
Permanent elongation at rupture %	10-15	30
Shore hardness No.	75-80	90-95
Rebound elasticity	50-55	45-50
Structural strength	High	High
Wear resistance	High	High
Abrasion	Very low	Very low
Coefficient of friction (Steel-Vulkollan)	0.1-0.3	0.1-0.3

Besides the two types in Table 1, the intermediary types 2000 and 2500 are available with approximate Shore hardness Nos. of 85 and 90 respectively. Where high wear resistance is required a material Vulkollan 3000 Special is supplied. The material can be used up to 100° C., but temperatures above 130° C. should be avoided. Below −20° C. the material becomes more rigid. It is highly resistant to solvents, but attacked by boiling water, steam and acids and alkalis. It is recommended for sealing purposes, diaphragms, clutch components, friction gears, valves, etc. A particular application, as developed by Continental, is for driving belts. These have a lower toothed profile and triangular ribs. A number of helically-wound steel wires prevent the belt stretching. Lengths up to 20 m. can be produced at present and the length of the belt can be maintained within ±0.1 mm.

These belts are suitable for belt speeds between 0 and 12,000 ft./sec.; but at the Hanover Fair only low running belts were demonstrated. Through the gears a slipless transmission of power is possible and the bearings are only lightly loaded. The specific load against the gear flanks is for average speeds to 40 and decrease for high speeds to 2 kg./sq. mm. This is certainly an interesting development and may solve difficult power transmission problems.

Further foam materials have been developed on the basis of isocyanates (Moltopren). This material also offers possibilities for decorative purposes. The combination of soft Moltopren with other plastics, in particular foils, has produced a number of applications.

MACHINERY.

FROM the extended production programme of screw extrusion presses Berstorff showed four different types with a screw diameter of 30 mm. for general purposes, 60 mm. with an extrusion head for tubes and profiles, and 90 mm. with an extrusion head for the production of foils (Fig. 2). On all machines the rotary speed of the screw is controlled, usually in the range of 15 to 90 r.p.m.

A series of modern extruders has been developed by A. Reifenhäuser. The cylinder containing the screw is accessible by removing the cover, and the screw can be easily exchanged by sliding it into the screw cylinder. The PIV-roller chain speed variator and the gear reduction for driving the screw are built into the rear of the housing. Various types of heads can be fitted to the extruder: (1) an angular extrusion head for covering wires, cables, ropes, etc., (2) a straight line head for producing flexible and rigid tubes, strands, tapes and profiles, (3) a crosshead for processing nylon, etc.,

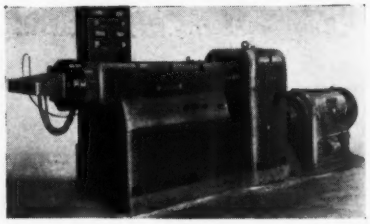


Fig. 2. Berstorff extruder with foil production die-head.

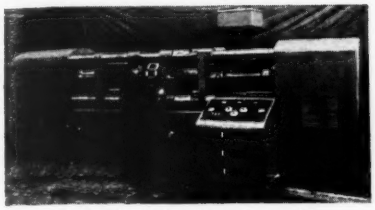


Fig. 3. The 350 g. Sommer machine.

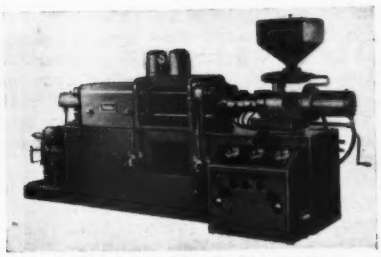


Fig. 4. The 50 g. Stübbe machine.

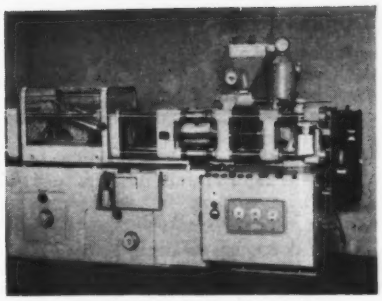


Fig. 5. The 15 g. Battenfeld machine.

(4) a blowing head for producing blown foils, and (5) a wide slot head for producing wide foils. Further, a granulating device for producing hard p.v.c. granules and a multi-colour head have been developed.

The only double-screw extruders exhibited were by P. Leistritz, Nuremberg, which are produced for extruding tubes of 52 to 120 mm. diameter. The two screws of varying pitch are rotating in opposite direction and are driven from a speed variator and reduction gears by slip clutch. Through the progressively reduced pitch the volume is reduced to $\frac{1}{4}$ to $\frac{1}{5}$ of the initial volume resulting in high working pressures and a thorough mixing of the material.

Injection Moulding Machines

The injection moulding machines for charges of 40, 60, 150 and 350 g. (Fig. 3) of Dr. Ing. Fritz Sommer, Nachf., Lüdenscheid, have hydraulic operation for both the locking and the injection slides. During injection the full pump pressure is acting without an intermediary toggle lever action, with the exception of the small 40 g. injection moulding machine where the moulds are closed by a toggle lever system. The high-speed rotary pumps can be adjusted by hand for volume and direction, ensuring a sensitive control of the machine. Control is by a single lever, but fully or semi-automatic control units can be supplied. Here the movements are controlled by an indexing mechanism partly operated by stop switches at the end of movements, partly by time switches in connection with a condenser and resistances.

The Stübbe injection moulding machines are supplied in sizes for 2-, 3-, 5-, 7- and 10-oz. (50 to 200 g.) capacity. The mould closing mechanism is operated hydraulically with a toggle lever system increasing the closing force. Fig. 4 is a view of the 2-oz. (50 g.) machine with built-in pump which can be operated fully automatically, semi-automatically or manually.

Battenfeld exhibited a new high-speed injection moulding machine with a capacity of 15 g. ($\frac{1}{2}$ oz.), which makes 15 shots per minute, as well as several models of their larger machine (Fig. 5). For closing the mould a crank mechanism is used with double toggle action. A new pneumatic cushion supplies a follow-up pressure after the mould is closed. The injection unit has a separate motor operating the injection cylinder through gears and safety slip clutches; four different speeds are provided.

Moulding Presses

It might appear that owing to the rapid development of injection moulding machines some interest has been lost in compression moulding presses. Battenfeld, Meinerzhagen i.W., showed a 50-ton press mechanically operated by toggle levers (Fig. 6), a design which has been in use for many years. J. Krause, Hamburg-Altona, showed a hydraulic press for the moulding of polyester materials (Fig. 7). Driven by a 6 PS three-phase motor the pressure can be adjusted up to 60 tons. Hydraulic presses from 60 to 300 tons are made by Bussmann, Munich. Tuckmantel, Solingen-Wald, showed several of their hydraulic presses, built for pressures from 40 to 350 tons, in welded-steel frames. A new two-stage pump is used in which the oil circulates at low pressure when the maximum pressure is reached, thus resulting in a unit of longer life. The maximum pressure can be controlled manually. The control instruments are fitted in a separate unit at the left-hand side of the press.

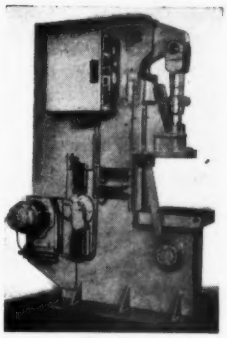


Fig. 6.

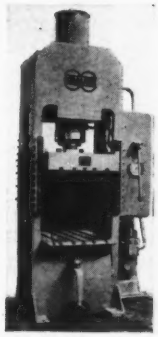


Fig. 7.

50 and 60 ton compression presses.

Forming and Vacuum Forming

Great progress could be seen in the method of forming and embossing thermoplastics. The Plastiplast 54B machine has two tables side by side, so that constant production with only one operator is maintained. A manually movable infra-red heater gives uniform heating. Each radiator of the heating unit can be used independently, thus adapting the heating to the mould size. The drawing depth can reach 50% of the width or diameter. A strong vacuum is available and a compressed air blowing device prevents premature contact between the softened sheet and the mould. Compressed air is also used for ejection and cooling. The following figures were given: a 3 mm. thick Polystyrol plate (EB) is heated and formed in 40 sec. Material thicknesses from 0.5 to 5 mm. can be formed.

For smaller sizes and depths, forming operations can also be made on machines similar to electric foil welding machines. The Ufix deep-drawing machine of Körting Radio-Werke produces cylindrical containers with straight walls, useful for packaging of preserves, fruits and other foodstuff. Preferably a hard p.v.c. foil is used, which can be formed into a cylindrical or rectangular body of uniform wall thickness, with a minimum material consumption. For instance, a container of 6.2 cu. in. and a diameter of $2\frac{3}{4}$ in. with a depth of 1 in., is produced from a disc of $4\frac{5}{16}$ in. diameter and 0,066 in. (0.15 mm.) thick; about 1,000 of these discs weigh 4.5 lb. (2.2 kg.).

The Vacuum Automatic 55 of A. Schwalbach K.G. has a heating capacity of 5 to 7 kW., the largest area to be formed is 500 by 650 mm.; the maximum foil thickness is 4 mm. A compressor generates both the pressure as well as the necessary vacuum.

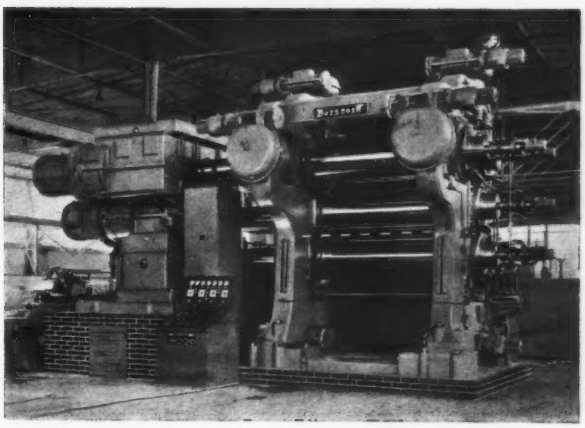


Fig. 8. The four bowl inverted L calender shown by Berstorff.

The unit is automatically controlled so that the stored supply is sufficient for quickly succeeding operations. The complete operation takes 10 to 80 sec., according to drawing depth and thickness of the material. When drawing out very deep components an additional vacuum cushion can be used. A hot-air blower effects a pre-stressing of the foils to obtain a uniform wall thickness.

Plastics Welding

Great developments could be seen in the field of plastics welding machines, which in their modern forms simulate the form of sewing machines.

The Primus 600 high-frequency welding machine with a 750-W. generator is built in horse-shoe shape. The welding head slides in two exchangeable phosphor-bronze bushes and all moving parts are enclosed. The high frequency of 40 Mc/s. applied reduces the danger of flashing. A large throat of about 12 in. facilitates the production of large articles, such as raincoats. A similar unit supplied by a 300-W. generator has also been developed, as well as a small table press and a pair of welding pliers.

The Körting toggle-lever welding press is equipped with a 500-W. high-frequency generator and can produce articles and packages with a welding area up to 20 sq. cm. (3.2 sq. in.). The welding time is pre-selected by a time switch and the electrode distance can be adjusted accurately to 0.01 mm. The pressure can be adjusted from 0 to 150 kg. (0 to 340 lb.).

Calenders

The largest machine exhibited was a four-bowl, inverted L, precision calender (Fig. 8) for thermoplastic foils and sheets with roller widths of 2,000 mm. (2.2 yd.) and diameter of 750 mm. (0.825 yd.). Each roller has a separate drive by a direct current motor, this giving a stepless speed regulation for each. Besides a uniform rotation of all rollers, friction effects up to a ratio of 1 : 2 can be obtained between each pair. The operating speed is between 2.5 to 50 m./min. (8.2 to 165 ft./min.). An inclination of the lower roller and of the transporting rollers is used to offset the effects of roller deflection.

Conclusion

This year's Hanover Fair, whilst not containing any revolutionary items so far as the plastics industry is concerned, showed clearly the substantial progress of German industry.

Small-load Hardness Tester

By V. BIRD

THE new "Finotest" small-load hardness tester recently developed by the well-known West German manufacturers of measurement and testing apparatus, Karl Frank G.m.b.H. of Weinheim-Birkenau, has been designed to bridge the gap between micro-hardness testers and hardness testers requiring high-test loads.

The instrument serves not only for testing hardness in accordance with the DIN specification 50,133, but covers a variety of test purposes, including the testing of plastics.

The test is performed by the Vickers method with the diamond pyramid of 136° surface angle. Other indentation methods such as those recommended by Knoop and Grodzinski may be used, where desirable.

The loading system includes a range of weights of 300, 500, 1,000, 1,500, 2,000, 2,500 up to 10,000 grams and is conceived in such a way that the weight bears directly and without friction on the indentor. An adjustable oil brake ensures the smooth application of the test load.

The optical equipment consists of a high-class instrument manufactured by Ernst Leitz, Wetzlar, and is a special microscope with inclined vision, illuminated visual field and interchangeable objectives for magnifications x 100—200 and 400. The micro-measuring scale gives readings of 0.001 mm. and can be used for measurements down to 0.0005 mm.

With this unit the smallest indentations are defined clearly with sharp outlines and can be evaluated quickly and reliably. Ground and lapped surfaces can readily be examined.

The photographic equipment for retaining records of test results enhances the value of the optical unit.

The high degree of visual accuracy guarantees smooth and reliable performance throughout the test. This is due to the practical and convenient arrangement of all the working parts and the very efficient microscope.

The hardness tester is swivel-mounted on a ground and spiral-threaded column which is fitted into a substantial cast-iron base 250 x 330 mm. (10 in. x 13 in.) in such a way that after making the indentation on the test sample a simple swivelling movement, to accurately set limit stops, positions the object ready for examination.

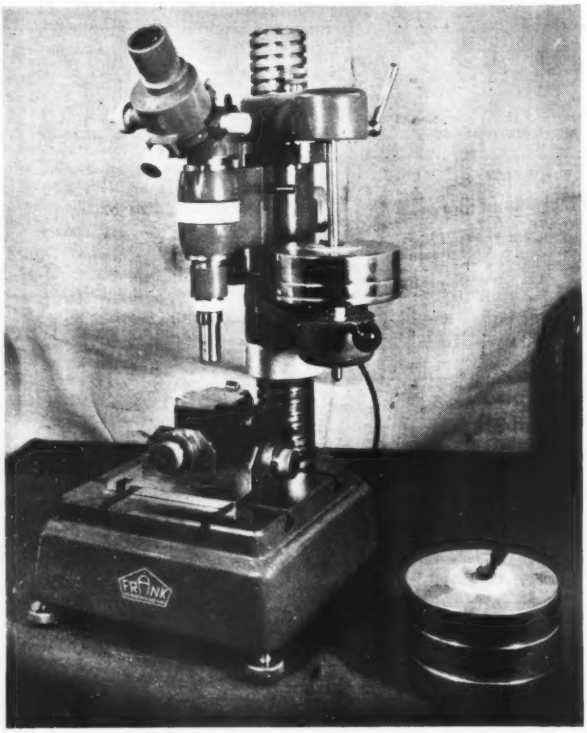
For testing large specimens exceeding the height of the instrument itself the testing head may be swivelled to 180° to extend beyond the edge of the test bench and larger specimens may be tested from the floor or raised as required.

The micro-tube is adjustable in height for specimens up to 270 mm. (10½ in.), when placed on the machined base or on the compound slide support. Special attention has been paid to the construction and fitting of the delicate parts to prevent dust intrusion to allow the instrument to be used in the factory as well as in the laboratory.

The microscope can be used advantageously in locating the test position on small or intricate specimens.

A number of accessories, including small parallel vice, large parallel vice, micrometer cross slide, and Collet head, are also available.

The new "Finotest" machine was, together with other new apparatus of Karl Frank G.m.b.H., displayed at the 1955 German industries Fair. For full report see pages 276-278 of this issue.



The "Finotest" small-load hardness tester exhibited at the German Industries Fair by Karl Frank, G.m.b.H.

Spray-Cast Tooling—An American Report

BY THOMAS A. DICKINSON

A description of an American method developed by Northrop Aircraft Inc. for the production of low-cost tools. This method of tool making has been particularly successful in the aircraft industry where only limited production runs are generally required.

MOULDING and laminating tools are being fabricated with exceptional accuracy and economy at Northrop Aircraft Inc., Hawthorne, Calif., by means of a new "Spray-casting" technique.

The process consists briefly of using a wire-type metallizing gun to build up a metal coating in or on a plaster negative for each tool. Reinforcements of various types which will be discussed presently permit the subsequent use of the coatings as tools with very good tensile and compressive strength.

Where optimum mechanical strength is required, such tools are not as long-lived as tooling casts produced by conventional means. However, apart from the fact that they may have many fine details which cannot be produced in most castings, they greatly reduce the cost of tooling for many practical purposes.

For instance, where a sand-cast tool, worth over $500, would once have been specified for the production of contact laminates, Northrop has obtained excellent results with a spray-cast tool that cost only $80.

Plaster negatives for spray castings are fabricated by means of the same materials and methods that are customarily employed by foundrymen in making plaster patterns. Then, after they are thoroughly dehydrated, they are coated with a material known as "Safety Walk"—which, among other things, enables sprayed metal particles to adhere to plaster surfaces.

Next, the negative surfaces are primed by using a metallizing gun to spray a thin layer of zinc over the Safety Walk coating. Purpose of the zinc, as a rule, is to facilitate the application of metals with higher melting temperatures. However, zinc has been used as both a primer and basic tooling material in some circumstances.

Virtually all metals that are available in wire form can be sprayed over a zinc primer, but for most purposes at present Northrop engineers prefer aluminium and bronze coatings. The latter are built up to a thickness of about $\frac{1}{8}$ in.

All metal spray coatings are applied slowly in order to avoid excessive heating, which could cause them to lift and crack.

The coatings are reinforced for use as compression moulds with cast Cerrohigh, a lead-bismuth alloy, before they are separated from their plaster negatives.

Coatings for contact-pressure moulds, which do not require high mechanical strength, are reinforced with $\frac{1}{2}$-in. thick fibre-glass laminates in order to minimize their weight. Fibre-glass layers in the laminates are bonded to one another and to the metal surfaces by means of a catalyzed polyester resin which is cured at a temperature of about 250° F. in a thermostatically controlled oven.

Following the reinforcement of a sprayed metal cast, the plaster negative is broken away from the metal. Then, as a rule, nothing more than a simple cleaning and polishing operation is required to obtain a finished tool.

Since labour is the only expensive item involved in fabricating a spray-cast tool, it is interesting to note that the gross amount of time required to produce individual tools has to date ranged from about 30 to 135 hours.

The largest tool thus far fabricated has approximately 10 square feet of work surface. Smaller tools have work areas amounting to less than one square foot.

Critical dimensions have been maintained within tolerances of ±0.0010 in.

Spraying the first coat of zinc on to the primed plaster negative.

A contact laminate being inspected after it has been formed from the spray-cast tool in the foreground.

A close-up of one of the larger spray castings.

A tool in action on a compression press forming laminate components.

Recorded Views

Concluding the recorded conversations on our stand at the British Plastics Exhibition in June. The first series were published on pages 250-253 of the July issue of "Plastics," and once again we thank the visitors to our stand who co-operated.

Introducing **Mr. Odd. M. Lien,** of Norway.

What has impressed you most about the Exhibition so far, from the machinery point of view?

I should say the whole exhibition has impressed me very much indeed. From the machinery point of view I am very interested to see that the Windsor machine is working with unplasticized p.v.c. Of course, that is something new, although I don't know whether there is the demand for such a large machine in Norway. It would be very expensive, and the capacity might be too great. It could satisfy the market much too quickly to be able to keep it in active use.

Some other machines I have seen, such as vacuum coating machines, also have too great a capacity for us in Norway. Although, of course, they make very handsome products.

It is better from Norway's point of view at the moment to concentrate on the smaller type of injection moulding machine so that the capacity is not over-used.

That is right. As a matter of fact there is only one 10-oz. machine in Norway, the Government won't licence any more machines because they believe that one 10-oz. machine is enough to cover the demand. There are quite a lot of similar smaller machines.

You have in fact a Government control on the import of machinery of any kind.

It is very difficult to get import licences; you would have to put forward a very good case indeed if you were to get a large machine into the country.

On the question of materials. Have you seen any big progress in the materials on display here?

Well, I thought I knew something about plastics but, having walked around and having seen so many new things I am very impressed indeed.

How is the progress in the use of materials like p.v.c. and polystyrene in Norway?

Polystyrene is very commonly used, next in size after p.v.c. Consumption of p.v.c. is more than that of polystyrene, and is about 2,000 tons a year.

Two thousand tons? That's quite a large tonnage.

A considerable amount of that goes into floor tiles and other flooring materials.

Are you, as an agent for raw materials manufacturers in Britain, looking for any improvements which your customers in Norway have asked you for?

Well, only small details. My main object is to pick up ideas in moulds which I can give to my customers, so that I can contact the English firms and hire moulds, in other words, so that I can help our customers to get new ideas.

You are giving in fact a first-class sales service.

That is what I am aiming at.

Some of my customers are very impressed by the dry mixing of p.v.c.

That gives economy in use. You can use one basic material and colour it to your own requirements.

Yes. This is fairly new in Norway, and many fabricators have asked me about suppliers of machines and so I have contacted a few firms and asked prices, details and sizes. This helps our customers and also sells the raw materials.

Are you also selling the polyester resins in Norway for reinforced plastics?

Yes, the polyester resin, we are. There are a few firms experimenting, and I think it will develop.

I understand you have already experimented with small craft in Norway, such as dinghies.

Yes, the small boats are in production. There is also another firm building snow sledges for the Army, for use in the far north of Norway. That is a good application, and appears to be successful.

Would you care to select any one plastic material which you consider has the greatest future in Norway from the point of view of the immediate market consumption out there? Do you think polystyrene, for example, has the biggest future?

I don't think so; I think it will be p.v.c. and polythene. Polythene is very much used in Norway now for water pipes. On the farms they have these pipes to take water from their wells; and also to their houses. They are much cheaper than ordinary piping, but I don't think they are allowed to use them in towns because of the pressure. But the pattern in Norway will follow the pattern in this country, that is the greater use of polythene and p.v.c., because of the greater uses to which they can be put.

Are there any manufacturers of p.v.c. in Norway at all?

Yes, there is the Norsk-Hydro, they are making over 2,000 tons and they are actually exporting. They are making paste resins and ordinary resins.

So we have a two-way exchange of materials?

Exactly. If we did not get our import supply then we could not sell anything to our Norwegian customers.

I suppose it is true also to say that in Norway injection moulding is making a much bigger progress than compression moulding?

Yes, that is right. I believe compression increased a little after the war but it now seems to stand fairly steady. There has been an enormous increase in injection moulding. It was only in 1945-46 that the first injection-moulding machine came in, and it has been increasing ever since. They started in small factories and now they are going into big ones.

And what is the public outlook on plastics in Norway?

I think they are more and more believing that plastics are materials that have come to stay. After the war, for a little while, plastics materials were used for the wrong purposes. Materials were incorrectly used and got a bad reputation to start with, but we have had two plastics exhibitions in Oslo and I think this has helped quite a lot.

★ ★ ★

Introducing **Mr. Alun Thomas,** of Monmouthshire

You actually come from a pit in which this plastics belting has been installed. How much belting have you got in the pit?

I should say somewhere in the region of 1,000 ft., and it is intended that they are going to be used more and more in the future. The National Coal Board has suspended all orders for rubber belting.

So in fact all belting that goes into the pits will have to be p.v.c. belting?

That is correct.

Of the fires that occur in the pits how many in fact do you think occurred because of belt fires?

Well, we have not experienced any in our Division.

So that this is really a precautionary measure; in the event of fires the belting won't burn? Do you know of any experiences in other Divisions where fires were caused by belting?

Well, the Cresswell disaster was a very bad fire, and it was caused by a belt fire.

That was a very serious one. Is there any difference between the rubber and plastics belting in use?

Some makes of p.v.c. do give better service.

So that you get a longer life and you also have a product which is particularly safe in use. And are you using any p.v.c. brattice cloth as well?

Yes, we are, and with great success.

I take it that this is used to seal off sections of the pit?

Yes, and to deflect toxic gas from reaching areas where the main current of air cannot reach.

I see, so that in fact it assists the ventilation in the pit.

I understand there are additional uses of plastics in the pits, one of which is the use of a phenolic laminated helmet. Is it an improvement over the old type of helmet which you used to use?

Yes, it takes quite a bump.

Would you say it is lighter in use?

Yes.

And what about the use of these p.v.c.-lined fire hoses?

They are used quite a lot in many pits.

What you are saying in effect is that there is a very big increase in the use of plastics in the pit. I understand that you also use these new materials for shoulder caps and knee pads. That takes some of the strain off when you are digging underground. And what about ventilated tubing?

That stands up to some very severe use.

In your opinion these materials give you as good use in active service as the materials which were used before, such as rubber and brattice cloth?

They do.

★ ★ ★

Introducing **Mr. van Bochove,** of Holland

Mr. Van Bochove, you are from the Plastics Research Institute, T.N.O., in Holland, which is a semi-state organization investigating the uses and formulation of plastics materials, and this is the second British Plastics Exhibition to which you have been? You were here in 1953?

Yes, I was here with much pleasure.

In your opinion, having looked around the Exhibition now, do you see any improvements in what you have seen here? Have we made any progress during those few years?

Well, I have not had an opportunity to see the whole of the Exhibition, but my first impression is that there is indeed progress in the articles shown. But what I further observe is that the exhibition hall is getting too small and I have heard from one person at least that it is the intention to take another larger hall next time. I should think this will be necessary.

Yes, we have next door the Grand Hall at Olympia which is about twice the size of this one and we understand that in 1957 the Plastics Exhibition will be held there. Perhaps it will also be international.

International on a smaller scale, I should think. That is a good idea. As it is often stated it is very useful to visitors to such an Exhibition to have the opportunity to exchange ideas and to see machines of the same kind besides their own. They want to compare the advantages and disadvantages and I should think that this would be very useful, this alteration of the character of the Exhibition.

Yes indeed. Well now, Mr. Van Bochove, you in the Plastics Research Institute in Holland have the opportunity to see the development of the plastics industry in the Netherlands. How is the development going, is it going well?

I should say it is going very well at the moment and especially in the machinery field we have seen some important developments, in the last few years. As you might know there are being made two injection moulding machines at the moment in our country.

You mean they are the home produced machines, but being built under licence?

Yes. Besides that there were some notable new applications especially in the field of nylon. As you might know again we have a large production of nylon in Holland.

Yes, that is the nylon 6 made by the A.K.U.

On the other hand there is notable activity in the polyester field.

That is very interesting. We have heard that there is a boat-building company in Holland which is building life-boats from glass fibre and they have been accepted by the Dutch Government as suitable for use.

Yes, they passed the test.

Have you seen any great increase in injection moulding in Holland?

I think the capacity of our injection moulders and other moulding shops is enough at the moment. We even have some capacity over.

I see. Do you think that progress is still being made in the compression moulding field or has the compression moulding industry reached its maximum capacity in Holland?

I don't think that the capacity is being enlarged. This is the case with the materials used. There is some activity with other moulding materials, phenol formaldehyde, urea formaldehyde, especially the alkyd resins and the fast moulding resins. Furthermore I can say there is some rather large activity in the vacuum forming field. There is a good chance that we start manufacture of vacuum forming machines in Holland ourselves.

Well all of the people we have interviewed so far have reported great interest in vacuum forming in their own countries, particularly in packaging and for display purposes. And I should imagine in Holland, too, many people are interested because of the low cost of the moulds used.

At the Jaarbeurs (the Annual Fair), in Utrecht, there was for the first time a special division for plastics.

That is interesting.

This was the first time that firms working in the plastics field were brought together in one hall with their stands. And in addition there was a special room erected for giving popular lectures on plastics. And it has been observed that moulders in our country are busy helping to make the public conscious of the possibilities and to teach them to see what is a good application and what is not, and that is a very good thing.

Measurement of the Degree of Cure of Polyester Resins by the Wallace Micro Indentation Tester

By F. N. B. BENNETT,* A.F.R.Ae.S., and R. HAYES,† B.Sc., A.R.C.S., A.Inst.P.

A method of cure testing is described here with a detailed discussion on the machine employed.

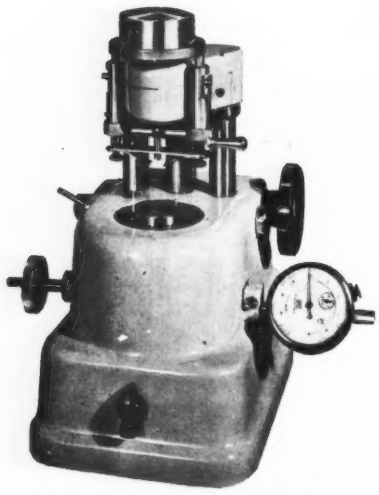


Fig. 1.—The Wallace Micro Indentation Tester.

WITH the increasing use of polyester resins, considerable interest has been focused on the measurement of their degree of cure. A number of methods has been used, such as measurement of power factor, water absorption, flexural strength and hardness, but of these the measurement of hardness is the quickest and simplest to carry out.

A new hardness tester, which can measure the surface hardness of rigid and flexible materials, has recently been marketed by H. W. Wallace and Co., Ltd., and this has been used to obtain a measure of the degree of cure of polyester resins and laminates.

The Wallace Electronic Micro Indentation Tester is particularly sensitive and is capable of detecting very small variations in hardness. The function of the instrument is to measure accurately the depth of penetration of an indentor into a material under a known dead load. Any shape or size of indentor can be used and any load selected from a fraction of a gramme up to 3.5 kilogrammes. The depth of indentation is measured directly by means of a standard dial gauge.

Principle of Operation

The instrument consists basically of an indentor and a means of applying both minor and major loads to the indentor. There is a table on which the specimen is mounted and indentation is measured by raising this table until the indentor is returned to the exact position it occupied before the major load was applied. It is a comparatively simple matter to measure accurately the amount the table has to be raised and friction in this measuring device is of no consequence. The exact position of the indentor before and after the major load is applied is termed the "null" position, and this is identified most efficiently by means of a simple electronic "null" indicator.

Construction

The method of mounting the indentor has eliminated friction and this has resulted in outstanding sensitivity. Leaf springs support the indentor assembly, which normally floats in the "null" position when no load is applied. When an indenting load is applied the leaf springs deflect, but as the indentor is always returned to the "null" position, the leaf springs do not influence the value of the indenting load.

A diagrammatic sketch of the instrument is shown in Fig. 2.

The "null" indicator consists of two oscillatory circuits which are coupled together and which are beating at nearly the same frequency. The frequency of one of these circuits is altered by movement of the indentor by means of a capacitor, which is actuated by the indentor. When the two circuits are operating at exactly the same frequency no resultant beat can be heard in the earphone. If the frequencies are not quite the same, an oscillation can be heard in the earphone and the pitch of this oscillation depends upon how different the two frequencies are. The "null" position of the indentor is, therefore, indicated by a silence in the earphone located immediately between two oscillations. With a little practice the operator quickly obtains the "feel" of the test from the change of pitch of this oscillation.

The electronic equipment, which has been found to be particularly reliable, is a self-contained unit located in the base of the instrument. The circuit reaches a state of stability after warming up for about 15 minutes, and as it is used only as a "null" indicator, changes in the characteristics of components due to ageing do not affect the accuracy of the instrument.

The measuring device is housed inside the base of the instrument and is securely protected against dirt and moisture. This consists of an accurately made wedge which is traversed in beneath the table of the instrument by means of the handwheel on the left of the illustration, Fig. 1. The horizontal movement of the wedge is measured by the dial gauge and is directly proportional to the vertical movement of the table. The dial gauge is of standard design, which means that the instrument can give readings in inches or millimetres to suit individual requirements. The ratio of movement between the dial gauge and the table is 10 to 1 and, therefore, a "0.0001" dial gauge was used to measure indentation in units of "0.00001."

The indenting weights are supported on a carrier situated at the top of the instrument and these are transferred to the indentor by means of the load-applying lever.

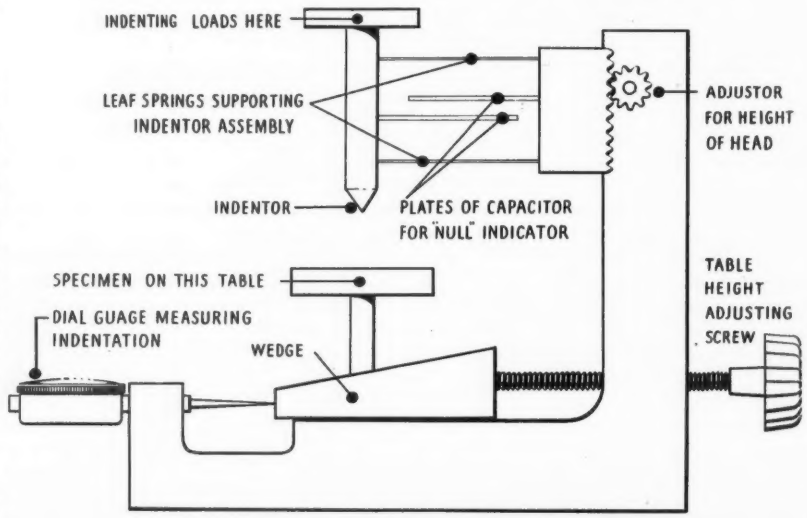


Fig. 2.—Diagrammatic view of the Wallace Micro Indentation Tester.

* H. W. Wallace and Co., Ltd. † British Resin Products, Ltd.

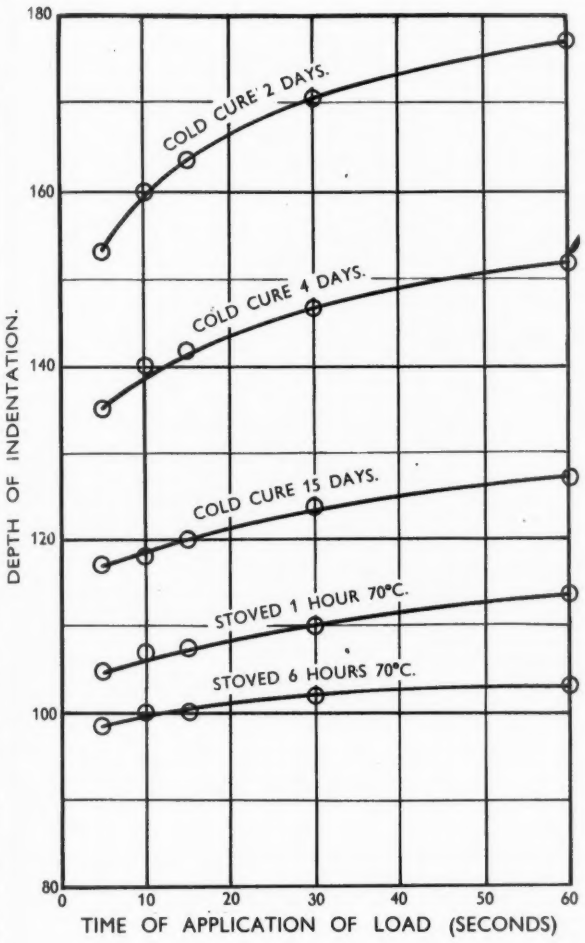

COLD CURE 2 DAYS.
COLD CURE 4 DAYS.
COLD CURE 15 DAYS.
STOVED 1 HOUR 70°C.
STOVED 6 HOURS 70°C.
DEPTH OF INDENTATION.
TIME OF APPLICATION OF LOAD (SECONDS)

Fig. 3. (Left) Cellobond polyester resin cast. Indentation versus time of application of load.

Fig. 4. (Below, right) Similar results as in Fig. 3, with the same resin, this time with a glass mat reinforcement.

The use of an audible " null " indicator is particularly convenient, as it leaves the operator free to observe a stop-watch. At the end of the loading period, the operator stops turning the handwheel and the reading reached at that precise instant remains on the dial gauge.

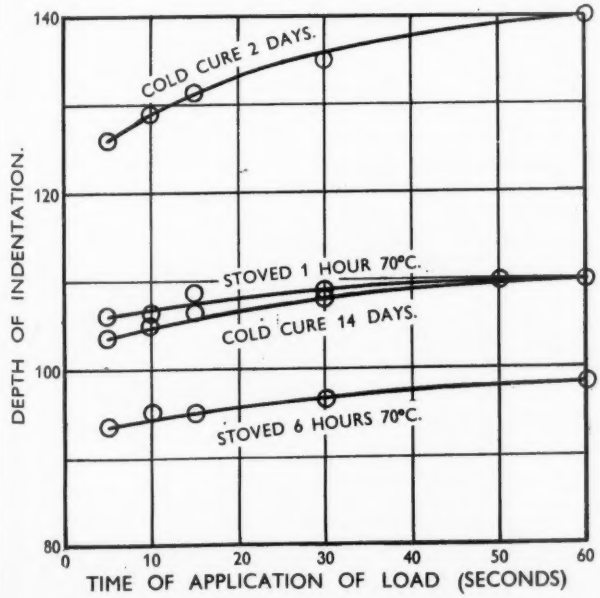
Tests on a Polyester Resin

The hardness of a Cellobond polyester resin was determined in (a) its unfilled state, (b) when it was reinforced with a 1½-oz. glass mat, and (c) when it was reinforced with a woven glass cloth. The unfilled and the reinforced resin was gelled at room temperature between glass plates to give samples in the form of flat sheets. The sheets were cut into small specimens. Some specimens were maintained at a temperature of 23° C. and their surface hardness measured at various intervals, while other specimens were stoved for various times at 70° C. and then tested.

In this work a Vickers diamond indentor was used with a 1 g. minor or contacting load and a 300 g. major load. The depth of indentation was expressed in units of 0.00001 in.

Fig. 3 shows the results obtained on the unfilled cast resin when depth of indentation is plotted against time of application of load. The different curves represent specimens which have had different curing times of temperatures.

Fig. 5. (Below) Showing results obtained with same resin as in Figs. 3 and 4, with glass cloth as the reinforcing agent.


COLD CURE 2 DAYS.
STOVED 1 HOUR 70°C.
COLD CURE 14 DAYS.
STOVED 6 HOURS 70°C.
DEPTH OF INDENTATION.
TIME OF APPLICATION OF LOAD (SECONDS)

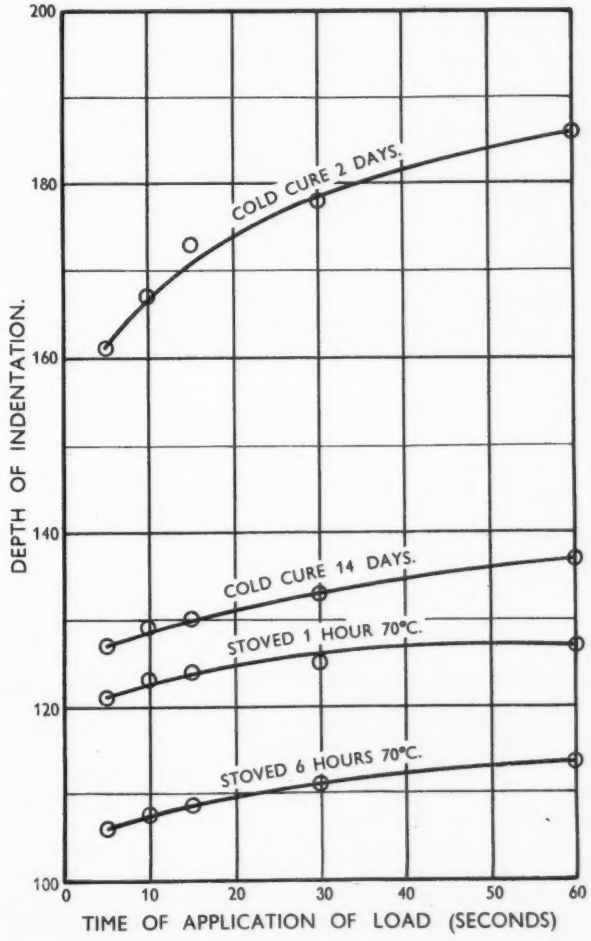

COLD CURE 2 DAYS.
COLD CURE 14 DAYS.
STOVED 1 HOUR 70°C.
STOVED 6 HOURS 70°C.
DEPTH OF INDENTATION.
TIME OF APPLICATION OF LOAD (SECONDS)

Fig. 4 shows similar results obtained on the same resin, reinforced with a glass mat, while Fig. 5 shows the results obtained when a glass cloth reinforcement was used.

From Figs. 3, 4 and 5 the following points can be seen:—

(a) As the cure improves with increase of time or stoving the hardness increases, i.e., the depth of indentation decreases.

(b) As the cure improves, the rate of increase of depth of indentation with time decreases, i.e., the better the cure the less the "creep."

(c) On being stoved for six hours at 70° C., the cast, the glass mat reinforced laminate and the glass cloth reinforced laminate give very similar depths of indentation.

Point (b) is of interest because it shows that not only can the actual "hardness" be used as an indication of degree of cure, but that the amount of "creep" is also a good indication.

Point (c) shows that the final cured hardness is comparatively independent of the fillers used. This is a reasonable result when it is remembered that it is the hardness of the thin surface skin that is being measured, the depths of indentation being very small, ranging from 0.001 in. to less than 0.002 in.

As has just been mentioned, in this work it is the surface hardness which has been measured. If the hardness of the surface is not representative of the bulk of the material, as might be the case when a resin surface suffered from air inhibition of cure, misleading results could be obtained if it were the intention to examine the state of cure of the mass of the resin. Greater indenting loads, with consequently greater depths of indentation, would help in this respect, but the filler would then be likely to have a greater influence on the hardness reading.

Although the average hardnesses of the stoved samples with different fillers were similar, the scatter of results obtained on any one specimen did vary with filler. The points shown in Figs. 3, 4 and 5 represent the average of at least two specimens, each specimen being tested at three different points. The average range of the three results obtained on any one specimen was as follows:—

	Average range of 3 results
Cast resin (unfilled) ...	6 units
Glass mat filled resin ...	16 units
Glass cloth filled resin...	12 units

This shows that, as would be expected, the scatter of results is less with the unfilled resin than with the filled resin.

It is of interest to compare the variation of hardness of a polyester resin with cure, with the variation of other properties with cure. Table 1 shows typical values for flexural strength and modulus in bending of an unfilled Cellobond polyester resin, while Table 2 shows similar values for a Cellobond polyester resin/glass cloth laminate.

From Tables 1 and 2 it can be seen that the cast resin and laminate have, after two days' cure at room temperature, gained approximately 75% of the maximum flexural strength they can attain after stoving at high temperatures, while with further cure at room temperature the flexural strength approaches 90% of the maximum.

The modulus in bending changes to a greater extent with cure time and temperature than the flexural strength. As could be expected, this is reflected in the hardness measurements, which also change to a greater extent than the flexural-strength measurement. This shows that not only is the measurement of hardness a simple and convenient method of estimating degree of cure of polyester resins, but it is also a fairly sensitive one.

Conclusions

It has been found that the Wallace Micro Indentation Tester can estimate the degree of cure of unfilled polyester resins and resins containing glass filler by measuring surface hardness and degree of creep. The scatter of results is greater, however, with the filled resin than with the unfilled resin.

The instrument has the advantage that very small and very thin specimens can be tested without damage to the sample. It would not be recommended for the "in situ" testing of large mouldings, such as boat hulls and car bodies, where the obvious requirement is for a small portable spring-loaded instrument. The design of a suitable instrument for this purpose is now under consideration.

Acknowledgments

The authors would like to thank the directors of British Resin Products, Ltd., and H. W. Wallace and Co., Ltd., for permission to publish this paper.

TABLE 1

Effect of cure-time and temperature on flexural strength and modulus in bending of an unfilled Cellobond polyester cast.

Time	Temperature °C.	Flexural strength	Modulus in bend
		lb./sq. in.	lb./sq. in.
2 days	23	11,200	3.4×10^5
5 days	23	13,100	3.4×10^5
8 days	23	13,900	4.3×10^5
24 hours	70	14,800	5.4×10^5
24 hours	150	14,200	5.8×10^5

TABLE 2

Effect of cure-time and temperature on flexural strength and modulus in bending of a Cellobond polyester resin/glass cloth laminate.

Time	Temperature °C.	Flexural strength	Modulus in bend
		lb./sq. in.	lb./sq. in.
2 days	23	39,400	7.3×10^5
7 days	23	49,100	2.7×10^6
20 days	23	45,600	3.0×10^6
1 hour	70	50,500	3.0×10^6
24 hours	70	48,800	—
1 hour	150	51,300	3.2×10^6
24 hours	150	54,300	—

Decorated Tableware

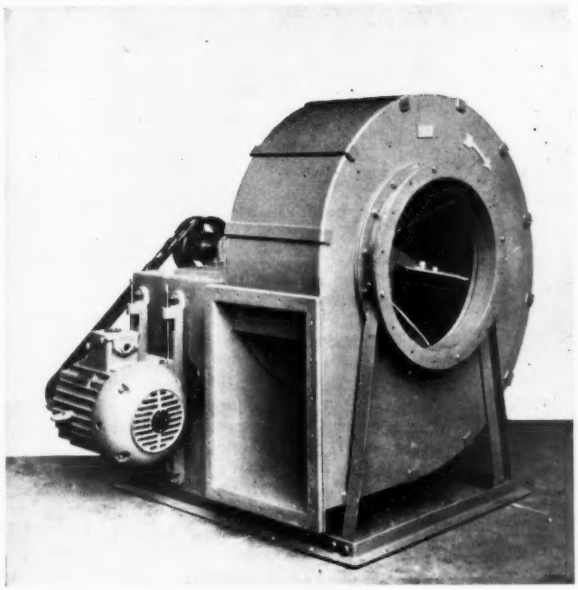
(Continued from page 270.)

or lacquer that is at least the equal in hardness and resistance to washing and staining as the base plastic. Such lacquers based on modern synthetic resins exist and, indeed, properly applied by spray or dipping and stoved, are already employed to an enormous extent in many industrial fields for the protection of metal, wood and so on, under onerous conditions. Our elementary experiments carried out on hand-painted melamine ware and coated with melamine lacquers subsequently stoved, proved, at least to our own satisfaction, that there was the germ of an idea in the process which might deserve further examination. The hand-painted decoration itself suffered no damage as a result of applying the lacquer, and following stoving, the surface was extremely hard.

It was therefore with considerable pleasure that during the past month we received a melamine plate and a urea saucer decorated in a similar manner, using a special transfer for the decoration, from Axon and Harrison, Ltd., of Jersey, who have been working on similar lines for some time. The famous paint and varnish manufacturers Pinchin, Johnson and Co. have collaborated in this work by supplying a special synthetic lacquer, which was applied and then stoved. The resulting surface is brilliant and exceptionally hard.

The value of this process lies in the fact that it is very amenable to mass production, especially so far as continuous line stoving is concerned. But the great unknown is still preponderant—can such lacquers withstand daily washing? Our own elementary experiments in this field proved promising, but the real answer lies with the paint and varnish technologist and the wealth of experience behind him.

NEW PRODUCTIONS



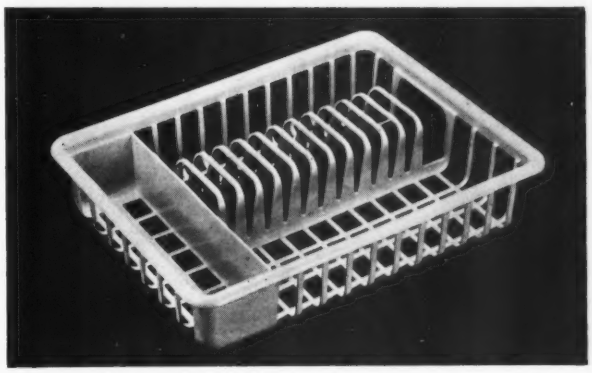
A paddle blade extractor fan manufactured by Turner and Brown, Ltd. The casing is formed from rigid p.v.c. and the metal blades of the fan are also completely sealed in p.v.c.

Extractor Fan

The latest addition to the range of p.v.c. paddle blade fans manufactured by Turner and Brown, Ltd., Davenport Works, Davenport Street, Bolton, is illustrated above. The fan which has been designed for the extraction of corrosive fumes, comprises an accurately balanced metal paddle blade impellor, completely sealed in rigid p.v.c., a technique developed and used exclusively by this company. The impellor shaft is also protected up to the inner side of the bearing. The fan casing is manufactured from $\frac{1}{4}$ in. rigid p.v.c. adequately stiffened. The shaft is carried in outboard bearings mounted on a mild steel pedestal attached to the side of the casing. The fan capacity is 7,200 c.f.m., $2\frac{1}{2}$ in. w.g., and power is supplied by a $7\frac{1}{2}$ b.h.p. totally enclosed electric motor. It is reported that this is the first time a fan of this capacity has been built in this material.

Dish Drainer

The new plastics dish drainer which Universal Metal Products, Ltd., Pendleton, Salford, 6, Lancs, are introducing is injection moulded from polystyrene. The design, as can be seen, is such that it will accommodate a dozen plates with a trough alongside for cups. The third compartment is for cutlery. The size of the drainer is $16\frac{1}{2}$ in. x $12\frac{3}{8}$ in. x $3\frac{1}{4}$ in., and it can be moulded in several shades to match almost any kitchen colour scheme. One of the advantages of this piece of equipment is that it allows dishes to drain perfectly without danger of slipping or breakage and can itself be cleaned in warm soapy water when required.



Injection moulded polystyrene dish drainer made by Universal Metal Products, Ltd.

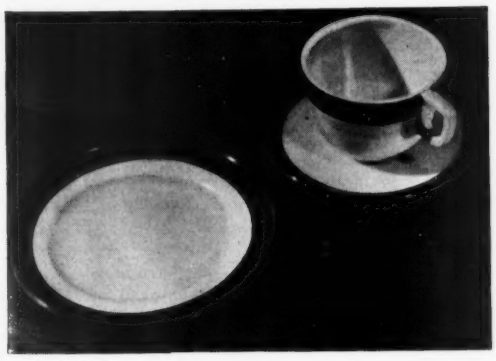
Decorated Tableware

One of the examples of decorated plastics tableware for the home and overseas markets is the urea cup, saucer and plate moulded by Halex. Decoration consists of a broad maroon rim on the ivory-white urea moulding.

The colour is fixed to the article by placing a resin-impregnated coloured paper on the moulding when it is partly cured. The press is then closed again to complete the cure thus keying the design or colour to the finished moulding. The appearance is greatly enhanced by this process and the articles illustrated are a good example of its use.

Deep Mixing Bowl

Jury Holloware, Ltd., of Brierley Hill, Staffs, have produced an addition to their range of polythene kitchenware, in the form of a deep mixing bowl 14 in. in diameter and $6\frac{1}{4}$ in. in depth. The bowl is injection moulded in a range of six colours. It is only within the last year that Jury Holloware, Ltd., well known for their vitreous enamel household ware, have entered the plastics field but already their list of polythene mouldings has attained a formidable length. These include egg trays, bowls, buckets, colanders and many other articles in common use in the kitchen.



(Left) Decorated tableware moulded in urea by Halex.

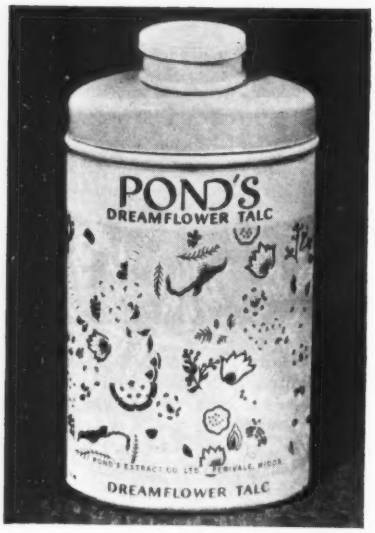
(Right) Deep polythene mixing bowl moulded by Jury Holloware, Ltd.

Deodorant Container.

Deodorant Stick Container

Illustrated are three specimens of the new "Dor" deodorant stick container which Universal Metal Products Ltd., of Langley Road, Salford 6, Lancs, are making for F. W. Hampshire Ltd. These are made in plastics material, the container being of pink paper-filled urea, and the cap made of white polythene. The cap is engraved with the word "Dor" and since it is flexible provides an excellent push-in fit to the container on which the wording is printed in green. This tight seal is most important as the deodorant stick has an alcoholic content and might otherwise evaporate. The side of the cap is ribbed for decoration and easy handling.

This pack, measuring 1⅛ in. diameter by 2½ in. overall length, is very light and compact, easily packed, and can be conveniently carried in a handbag if required.



Polythene Cap.

Polythene Flex Caps for Talcum Powder Tins

The latest additions to the Metal Box Co.'s standard range of closures for talc tins is the polythene Flex Cap, now being used for the first time by Ponds for their "Dreamflower" talc.

Moulded in attractive pink polythene the cap enhances the appearance of the complete pack. It is shaped so that a good grip is assured with resultant easy removal; yet owing to the flexible nature of the material and the sound design of the cap, a good, powder-proof closure is obtained.

These caps are available in a wide range of colours and will fit most of the standard Metal Box talc tins. Slight modifications which vary the external appearance of the cap are also possible.

Acid Carboy.

Polythene Carboy

Produced by Fibrenyle Ltd., of 157 Duke's Road, Western Avenue, London, W.3, the new 2½-gallon polythene carboy will be an addition to the range of polythene containers already produced by Fibrenyle. A notable feature of the design of the carboy is the moulded-in handle and grip at the base which considerably facilitates the handling of the carboy, especially when pouring. The cap is also moulded in polythene and is leakproof.

Clothes Line

One of the latest ideas from America is the Pin-O-Matic clothes line manufactured by Dennan Manufacturing Company of Providence, R.I. The line consists of twin strands of plastics-coated steel wire twisted about each other. The "spreader," which is moulded in Tenite butyrate, has a revolving centre through which the strands are threaded.

Tenite butyrate is marketed by Eastman Chemical Products Inc., Kingsport, Tenn.

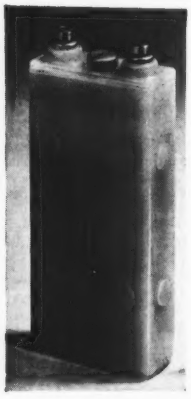
Lightweight Aircraft-battery

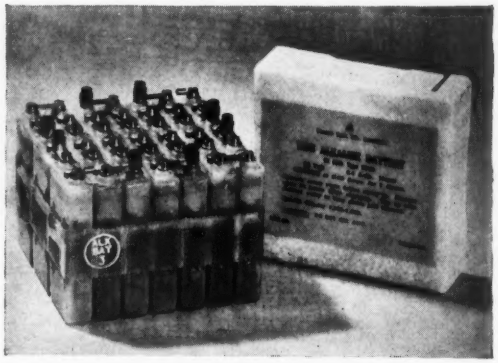
An ultra-lightweight, 24-volt alkaline battery for emergency duties in high-speed aircraft has been developed by Nife Batteries, of Redditch, Worcs., in conjunction with the Ministry of Supply. It provides emergency power for turn and slip indicators and cockpit lighting. Weighing under 3 lb., its overall dimensions are only 4.25 in. x 4.25 in. x 3.375 in. high.

Clothes Line.

The new battery, which is also available for civil aircraft and for export, is designed to operate without electrolyte leakage under aerobatic conditions at 60,000 ft. Through a unique method of construction, its mechanical strength is sufficient to withstand stresses of 30G in any direction. The battery consists of 21 nickel cadmium cells, type MPO4, with a nominal capacity of 0.4Ah. The emergency load amounts to 11W for a minimum of 20 minutes—5W for the turn and slip indicator and 6W for the cockpit lighting. Assembled in high-impact polystyrene containers, the cells are based on the standard Nife nickel cadmium design, combining reliability with freedom from self-discharge. The battery will, therefore, perform its duties even after long periods of idleness in any climatic conditions from Arctic to tropical with a margin of reserve sufficient to allow a final operating voltage in excess of the stipulated 21 volts.

Extreme mechanical strength is achieved by the new method of construction. The 21 cells are cemented together in a block (3 cells x 7 cells) and bound with glass fibre tape impregnated with polyester resin. The terminals are protected by a cover of glass-fibre-reinforced polyester resin with locating grooves for the hold-down clamps provided in the aircraft.



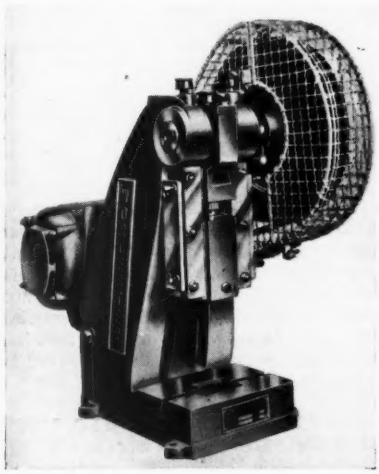


Emergency aircraft battery incorporating high-impact polystyrene and polyester/glass fibre in its construction.

Plastics NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes

INCREASE IN P.T.F.E. PRODUCTION.—Imperial Chemical Industries, Ltd., are making good progress with a new plant at Hillhouse, Lancashire, for the production of "Fluon" polytetrafluoroethylene. When completed this will have a capacity of about 200 tons, which will be achieved in two stages. The first stage, due in January, 1956, will mean that annual production of polymer is stepped up from 25 tons to 100 tons. The final 200-ton stage should be reached later in 1956. It is also planned to extend the present range to include an extrusion grade and special dispersions. I.C.I. hopes to reduce the price of "Fluon" later this year or early next year.



Bench Power Press.

THREE-TON BENCH POWER PRESS.—The new Worcester press introduced by Jones and Attwood, Ltd., of Stourbridge, has a standard fixed stroke of 1 in. or ½ in. and a ram adjustment of 1 in. It is powered by a 400/440-volt, 3-phase, 50-period motor with push-button overload release starter. It is claimed that it will easily punch $\frac{5}{16}$ in. diameter out of 14 gauge mild steel.

DOW INTRODUCE POLYTHENE.—The Dow Chemical Co. have commenced the manufacture of polythene under licence from I.C.I. Initially two grades will be available, for moulding and extrusion.

POLYESTER FILM.—A report in the Du Pont Magazine gives news of the use of metallized Mylar film as decorative panelling in the new American cars and metallized Mylar yarn in fabrics. In the electrical field it is stated that the film stands up to 4,000 volts without losing any of its properties.

ZIEGLER POLYTHENE.—Translations of the German patents taken out by Karl Ziegler for the polymerization of ethylene with the aid of previously formed Grignard compounds as activators have been prepared by Research Information Service of 53 Nassau Street, New York, New York State. Copies of the translations can be obtained from them, price $7.

NEW HOSE FOR SULPHURIC ACID.—A new flexible hose for carrying high concentrations of sulphuric acid is announced by the Flexibles Advisory Service of the Compoflex Co., Ltd., 26 Grosvenor Gardens, London, S.W.1. It has now been tested under actual working conditions by Pickfords Tank Haulage Service (British Road Services), who have used it on an average of five times a day during the past six months.

The concentrations of sulphuric acid which the hose has carried range from 77% to 94% and have been mostly Pyrites sulphuric acid. The make-up of the new hose consists of a stainless-steel wire helix; an inner liner of Molene (p.v.c.)-coated glass cloth; plies of polythene sheeting; a layer of untreated glass cloth; an outer cover of acid- and abrasion-resistant p.v.c., and finally a spiral of mild steel wire.

DRAUGHTSMANSHIP CERTIFICATE.—The Gauge and Toolmakers' Association has decided to introduce an award in the form of a Certificate of Gauge and Tool Design and Draughtsmanship, similar to the Certificate of Craftsmanship introduced over six years ago. The object of the certificate will be to offer an incentive for young men anxious to become really skilled draughtsmen and designers of tools and gauges.

PERMANOID, LTD., announce the opening of a Midlands branch at 558 Wolverhampton Road East, Fighting Cocks, Wolverhampton, Staffs. Telephone number, Wolverhampton 38367. This branch will cover the Birmingham and Midlands area and will carry comprehensive stocks of all types of Permanoid cables, together with Arrell television aerials.

ITALIAN SUBSIDIARY.—Edwards High Vacuum, Ltd., announce the formation of an Italian subsidiary company, Edwards Alto Vuoto S.p.A., which will have its offices in Milan and has been formed in conjunction with Messrs. Societa Apparecchi Elettrici e Scientifici, with whom they have had an agency relationship for many years. The new company commenced trading on July 1, 1955.

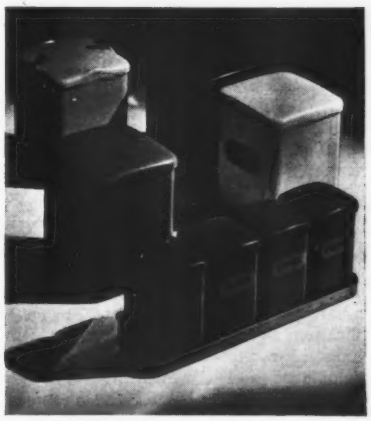
FORMATION OF NEW COMPANY.—Dunford and Elliott (Sheffield), Ltd., announce that the department of their company now operating from Linford Street, London, S.W.8, will be formed into a separate subsidiary company as from August 1, 1955. The new company will be styled Dunford and Elliott Process Engineering, Ltd. This company will handle the well-known rotary louvre dryers, coolers and roasters, and other expanding activities which are indicated by the new designation.

REORGANIZATION AT ASHDOWNS.—Ashdowns, Ltd., are to expand and develop their trade in the manufacture of laminated sheet and mouldings. In addition they will specialize in glass-fibre reinforced mouldings and sheet laminates (both flat and corrugated), and in the forming and fabrication of thermoplastic sheets.

It is understood that, as part of this reorganization, Ashdowns will be stopping the compression and injection moulding of powders.

CORRECTION.—In the June issue of *Plastics*, Pure Chemicals, Ltd., were listed as manufacturers of plasticizers. They are manufacturers of stabilizers and pigments, not plasticizers.

MODERN U.K. STAND AT THE 1955 CANADIAN NATIONAL EXHIBITION.—Several of the 565 exhibits on this stand, which will depict many facets of British industry, have been produced by the plastics industry. All the exhibits have been selected by the Council of Industrial Design, who have borne in mind the suitability of chosen goods for the needs of the Canadian market. The selection is intended to supplement the exacting demand for fine traditional products by encouraging a new demand for equally fine modern products. Among the plastics exhibits will be measuring cups moulded from wood-filled urea formaldehyde by Halex; polythene kitchen bowl, polystyrene refrigerator box set and household pail, also moulded by Halex; spice pots and food containers made by Brookes and Adams, Ltd., and designed by Ronald E. Brookes will also be shown.



Exhibits at the Modern U.K. stand produced by Brookes and Adams, Ltd.

G.E.C. APPOINTMENT IN LIVERPOOL.—Mr. H. H. Hatton has been appointed assistant manager of the Liverpool branch of The General Electric Co., Ltd.

NEW APPOINTMENTS.—Edgar Allen and Co., Ltd., have appointed to their board of directors Mr. B. B. Green and Mr. W. J. McBride.

A group of furniture manufacturers with some of the staff of Bakelite, Ltd., when they visited the Tyseley works of that company.

FRANCE-PLASTIQUE.—The 1955 Edition of France-Plastique, published under the auspices of L'Union des Syndicats de la Transformation des Matières Plastiques, 3 rue Copernic, Paris (16e), as in previous years contains a complete and comprehensive guide to the French plastics industry. The volume is well produced and indexed, with separate sections for materials, equipment, fabricators, fabrications, trade marks, names and addresses and societies.

INCREASE IN PLASTICIZER PRICES.—British Industrial Solvents announce an increase in plasticizer prices. The increase varies from 1½d. per lb. to 3d. per lb. with different materials.

INTERNATIONAL PRINTING EXHIBITION.—The uses of plastics in printing and its allied trades is becoming increasingly popular if the Ipex exhibition can be taken as a barometer of its popularity. A primary application as exhibited by several firms including Plastotype, Ltd., is the use of thermoplastic and thermosetting materials in the production of plates and matrices. Paramat, Ltd., showed the various stages which go to making up a plate including the use of a Bakelite phenolic as a matrix for rubber stereos and by electrodeposition of a Vybak, p.v.c. master.

Engraving machinery for colour or line blocks on plastics as well as zinc or copper were exhibited on many stands. One of the most interesting being the Elgrama electronic engraving machine shown by Aga Standard, Ltd.

Anti-static machinery included the Simco static eliminator made in England to an American specification by Sheridan Croxted, Ltd.

Book binding machines are generally using synthetic resin glues with resulting increased efficiency and a demonstration of spiral binding using Monoflex cellulose acetate extruded filament was carried out on a Dutch machine shown by Thomas E. Knight and Co. Speeds of 250 to 300 books per hour can be maintained and a binding length of 50 cm. can be accommodated.

VINYL PRODUCTS, LTD.—On page 228 of the July issue, the Vinamul emulsions were described as p.v.c. emulsions. They are in fact, p.v.a. emulsions used widely in the paint industry.

BRITISH PLASTICS FEDERATION PUBLICITY COMMITTEE.—The Council of the Federation has re-elected the publicity committee en bloc and has appointed Mr. N. B. Punfield as chairman in place of Mr. Walter York who resigned owing to pressure of work.

DR. W. BLAKEY has been elected to the board of directors of British Industrial Plastics, Ltd. Dr. Blakey has been with the company since its formation having originally joined its predecessor The British Cyanides Co., Ltd., as a research chemist in 1928.

Mr. J. E. Proctor with the full-time D.P.I. students at Borough Polytechnic.

DR. J. W. BARRETT has been appointed a director of Monsanto Chemicals, Ltd. He is already a director of Monsanto Plastics, Ltd., Monsanto Phosphates, Ltd., and Monsanto (Soil Conditioners), Ltd.

NEW APPOINTMENTS. — Bowthorpe Holdings, Ltd., announce the appointment of the following directors.

Mr. N. L. Keen—Bowthorpe Engineering Co., Ltd., and Cheltenham Plastics, Ltd.; Mr. M. Bernheim—Hellermann, Ltd.; Mr. H. R. Whyte—Hellermann, Ltd.; Mr. C. E. D. Catley—Cheltenham Plastics, Ltd.; Mr. A. R. Mason—Bowthorpe Engineering Co., Ltd.

MR. H. R. GLENDENNING has been appointed Midland area sales manager (moulding powders) for B.I.P. Chemicals, Ltd. Mr. Glendenning first joined B.I.P. in 1942, served four years in the R.A.F. and joined the company again in 1947, spending four years in the works and on technical service before moving to the sales staff in 1954.

OVERSEAS AGENTS OF B.I.P. MEET AT BIRMINGHAM.—As mentioned in last month's issue of *Plastics*, a most successful innovation was the conference of the overseas agents of British Industrial Plastics, organized at Birmingham during the British Plastics Exhibition. The photo below shows Mr. C. H. Glassey, managing director of B.I.P., in conversation with Mr. Douglas de Neegaard, the company's Swedish agent.

Mr. and Mrs. Lionel Daniels chatting with Sir Hugh Chance at the annual luncheon of the Plastics Institute.

Mr. Douglas de Neegaard chatting with Mr. C. H. Glassey at the B.I.P. conference.

Mr. Cvecko, Czech Embassy, and Mr. Priestman and Mr. L. H. Moore of East Anglia Plastics Ltd.

(Right) Examples of Czechoslovak plastics on show recently.

BAKELITE, LTD., TO MARKET POLYETHYLENE.—Bakelite, Ltd., have announced the conclusion of an agreement with Union Carbide, Ltd., under which Bakelite will market polyethylene plastics produced in the United Kingdom by Union Carbide, Ltd. The sales organization of Bakelite, Ltd., will be available for sales of this polyethylene both at home and in export markets.

Union Carbide, Ltd., are constructing a plant at Grangemouth in Scotland to produce polyethylene of the same quality and types as that now made in the United States by Union Carbide and Carbon Corporation, who are the largest manufacturers of polyethylene in the world. The plant is expected to come into operation in the third quarter of 1957, but in the meantime Bakelite will have available quantities of imported polyethylene for sales development purposes.

OPEN DAY AT PECO.—Projectile and Engineering Co., Ltd., held an open day at their works in London. Many friends of the company and relatives of employees were entertained by Peco and shown round the works. Interesting items on show included the 120 oz. injection moulding machine and the fully automatic 2 oz. machine.

Over 3,000 people attended the open day which ended with a display by the weight-lifting club.

CHANGES OF ADDRESS.—Mr. Edwin G. Fisher, thermoplastics consultant, now resides at 4 Palace Court, Bayswater Road, London, W.2, telephone number Bayswater 3271.

Industrial Plastics, Ltd., have moved to larger offices at 93 Regent Street, London, W.1, telephone number Regent 3146/9, and have also opened machinery showrooms at 93 Harrow Road, Paddington Green, London, W.2.

EXHIBITION OF CZECHOSLOVAK PLASTICS.—An interesting exhibition illustrating the development of the Czechoslovak plastics industry in recent years was held in London from June 3-10. The exhibition was organized on behalf of Chemapol, Prague, by their U.K. representatives, East Anglia Plastics, Ltd.

The exhibition showed many articles made from materials produced in Czechoslovakia.

A large section of the exhibition was devoted to Silon, a nylon-type polyamide moulding powder, which is now on sale in this country. Apart from many consumer articles made from this material, a large variety of technical products was shown. These included all types of gears, ball races, including a very large one used on railway engines, and roller bearing cages.

Another section illustrated p.v.c. which is now manufactured in Czechoslovakia. This section covered the whole range of products from garments to articles fabricated from rigid p.v.c., including large fittings used by the chemical industry.

A specially modified p.v.c. product was Sanplast, which is a rigid thermoplastic sheet, used for the production of splints and other surgical appliances, and has the advantage that it may be shaped accurately on the affected part when it will set rigidly.

Other sections of the exhibition showed mouldings made from Chemolite phenol formaldehyde and ranged from electrical materials, radio cabinets, machine and apparatus housings to fancy goods. Some of the special purpose phenol formaldehyde powders are now available in Britain.

Also shown were Umaplex acrylic sheet, the manufacture of which has now started in Czechoslovakia, and polyester resins.

The exhibition illustrated that Czechoslovakia has developed an up-to-date plastics industry which produces many of the basic raw materials and has a wide range of applications in many different industries.

Inquiries concerning Czechoslovak plastics should be addressed to East Anglia Plastics, Ltd., 52 Brook Street, London, W.1.

"Plastics in the Service of Man"

The following is a list of full names and addresses of companies mentioned in the illustrated feature "Plastics in the Service of Man," which appears on pages 272 to 274 in this issue:—

58. Plastics on Holiday—I

Airfix Products, Ltd., Haldane Place, Garratt Lane, London, S.W.18.
B.X. Plastics, Ltd., Higham Station Avenue, Chingford, London, E.4.
British Plasticon Products (B'ham), Ltd., 72 Summer Lane, Birmingham, 19.
Cascelloid (Division of the British Xylonite Co., Ltd.), Abbey Lane, Leicester.
Cellobond—British Resin Products, Ltd., Devonshire House, Piccadilly, London, W.1.
Coronet Cameras—Dufay, Ltd., P. and O. House, 14-16 Cockspur Street, London, S.W.1.
P. B. Cow and Co., Ltd., 12 Hay Hill, Berkeley Square, London, W.1.
Delmore, Ltd., 426-428 High Road, Chiswick, London, W.4.
Dermide, Ltd., Valley Mills, Meanwood Road, Leeds, 7.
General Celluloid Co., Ltd., 206 Hanworth Road, Hounslow, Middlesex.
Helos Supply Co., 232 Jubilee Street, London, E.1.
E. R. Holloway, Ltd., 26 Hyde Way, Welwyn Garden City, Herts.
Injection Moulders, Ltd., Westmoreland Road, The Hyde, London, N.W.9.
Initial Plastics, Ltd., 2 Brent Street, Hendon, London, N.W.4.
Kent Mouldings, Footscray, Sidcup, Kent.
J. F. Kenure, Ltd., Faggs Road, Feltham, Middlesex.
P. Pell and Son, Ltd., Pelcroft Works, Downs Road, London, E.5.
Scarab—British Industrial Plastics, Ltd., 1 Argyll Street, London, W.1.
Southampton Launch and Boat Co., Ltd., Southampton.
Tygan—Fothergill and Harvey, Ltd., Harvester House, 37 Peter Street, Manchester, 2.
U.K. Plastics, Ltd., Hook Rise, Kingston Bypass, Surbiton, Surrey.
Universal Metal Products, Ltd., Langley Road, Pendleton, Salford 6, Lancs.
Velbex—see B.X. Plastics.
Vybak—Bakelite, Ltd., 12-18 Grosvenor Gardens, London, S.W.1.
Xylonite—British Xylonite Co., Ltd., Highams Park, London, E.4.

(Left) Model of the stand of British Industrial Plastics at the Copenhagen trade fair next month.

TALKING SHOP . . .

Plumbing of the Future. At a recent meeting of the Registered Plumbers Association, Mr. R. V. Cooper, presented a very interesting paper specially abstracted in the issue of the *Plumber* for July. A large part of his talk was devoted to the use of plastics in his industry and he had much to say about the smallest room in the house, which, with plastic wall tiles, a plastic cistern, polythene overflow and water pipes and a p.v.c. flush pipe, is practically completely fitted in plastic materials. There is no doubt, of course, that, particularly with the supply of cold water, p.v.c. and polythene are already playing a very important part. An aspect of this development about which we have not previously thought was stressed by Mr. Cooper, the question of noise; particularly in large blocks of flats and offices one of the noisiest components are radiator and w.c. cisterns. In the former category plastics can at the moment offer little help, but their wide use for cold water piping, ball floats and for w.c. cisterns is, in fact, making an effective contribution to the reduction of this noise nuisance. Mr. Cooper pointed to the research that is being carried out by the Building Research Station on this point. There can surely be no more unsatisfactory noise than that of the traditional cast-iron cistern in action.

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Manufacturing Chemists' Association. I have just received the annual report for the year ended May 31 of the Manufacturing Chemists' Association Incorporated, which has its head office in Washington. Considerable space was devoted to plastics, particularly to a retailers plastics manual, of which over 20,000 copies have been distributed free to retailers, designers, distributors and others directly concerned with plastics merchandizing. Distribution was carried out by the Society of the Plastics Industry, but the manual itself was written and financed by M.C.A. plastic material manufacturers and apart from the great success that this book had in the retailing field, many organizations, especially department stores and mail order houses, are using it as a basic text in sales training programmes.

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Control in Polymer Technology. A three-week residential course of lectures, colliquia and practical experiments, will be held at the National College of Rubber Technology, Holloway Road, London, N.7, from September 5 to 23, 1955. The field covered will include the special properties of basic raw materials, both natural and synthetic, and their logical uses in attaining desired results. The course is limited to 42, and participants will be accommodated in Carlton Grange, the National College Hall of Residence. Fees, including residence, are 33 guineas for U.K. students and 45 guineas for overseas students.

The following lectures are being given:—

Lectures by Full-time Staff of the National College

(A) Chemical aspects, including analysis and control of raw materials and products (four hours). (B) Design of mixes and influence of processing on properties (three hours). (C) Physical testing and control (four hours). (D) Thermal problems (one hour). (E) Instrumentation for control (three hours). (F) Machine features and control of product (two hours). (G) Latex technology with special reference to compounding and control (four hours). (H) Tools of research (two hours).

One-hour Lectures by Visiting Specialists

(I) "Newer Aspects of Reinforcement Theory with particular reference to Tearing and Abrasion," and (J) "Engineering Applications of the Theory of Rubberlike Elasticity," by L. Mullins, B.Sc., F.Inst.P., British Rubber Producers Research Assn. (K) "Synthetic Rubbers," by S. C. Kilbank, B.Sc., of the Polymer Corporation, Ltd., Sarnia, Canada. (L) "Rubber Resin Blends," by Dr. E. M. Evans, British Resin Products, Ltd. (M) "High Styrene Copolymers of Butadiene in Footwear," by L. Bottomley, A.M.C.T., Monsanto Chemical Co., Ltd. (N) "Antioxidants and Ageing Phenomena," by H. E. Wechsberg, Ph.D., B.Sc., A.I.R.I., A.N.C.R.T. (O) "Oil Seals," by J. A. Stephens, A.I.R.I., Ronald Trist and Co., Ltd. (P) "Silicone Rubbers," by D. W. Lancaster, B.Sc., A.R.I.C., Midland Silicones, Ltd. (Q) "Finishes for Rubber," by Dr. H. J. Stern, F.I.R.I. (R) "Polyvinyl Chloride," by A. E. Lever, A.I.R.I.

Practical and experimental work will be carried out, three periods have been set aside for technical films, and special demonstrations will be given by means of the College's internal television equipment. Applications should be sent as soon as possible to the Head of the National College, Dr. F. H. Cotton, at the above address.

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Automatic Control in the Process Industries. A joint conference of the Institution of Chemical Engineers and the Society of Instrument Technology will be held in the Grand Hall, Caxton Hall, Westminster, London, S.W.1, on October 4, 1955. Further details may be obtained from the general secretary, Institution of Chemical Engineers, 56 Victoria Street, London, S.W.1.

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Dropped O. On Page 242 of the July issue of *Plastics* mention was made of the multi-punch pelleting machine of B.I.P. Engineering, Ltd. The production rate was given as "up to 2,500 pellets per hour." We dropped a nought somewhere, for it should, of course, be 25,000 pellets per hour. On the same subject, a paragraph describing the stand of Rosedale Associated Manufacturers, Ltd., at the British Plastics Exhibition included a line of type from another company's exhibit. For the benefit of any readers in doubt, Rosedale's are not connected with Storey's of Lancaster!

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Junior Lecture. On October 4 the first lecture specifically designed for younger members of the industry will be held by the London Section of the Plastics Institute. Focused on the age group 16-26, the meeting will be open to all, members of the Institute and others, and companies in the London area are encouraged to send along their younger personnel. Mr. K. R. Lawrence, A.R.I.C., of the injection moulding division of British Moulded Plastics, Ltd., will talk about moulding processes today, and a film will illustrate his theme. Mr. H. P. Bridge, managing director of British Moulded Plastics, Ltd., will be present as chairman. The meeting will be held at the Wellcome Institute, Euston Road, at 6.30 p.m. It is hoped that special lectures of this kind will become a regular feature of the London Section's programme, ensuring that the interest of younger members of the industry are properly catered for.

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Sweet Silence. Several of the national newspapers have recently publicized a new chocolate wrapping system designed for concerts and the theatre which can be opened without people being annoyed by the crackling of paper. Considerable amount of research has produced noiseless chocolate boxes which make use of a handsome quantity of polythene film. An additional advantage may well be the better preservation of the chocolates themselves under store.

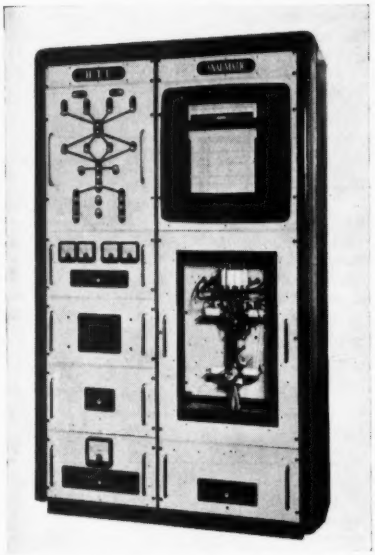
PLASTIKON.

Kunzle's chocolates, specially packed for the theatre, with polythene film replacing the normal paper wrapping. Silent in use but still elegant to look at.

British Instrument Industries Exhibition

A review of some of the many instruments which are now available to manufacturers and which were shown at Earls Court last month

THE plastics and chemical industries have a particular interest in the instruments industry as it is upon the skill of the instrument maker that the success and quality of their finished products so largely depend. The British Instrument Industries Exhibition held at Earls Court provided a shop-window for the technician to see what advances have been made. By no stretch of the imagination could it be said that all on show was relevant to the plastics industry but sufficient was exhibited to justify its inclusion here.

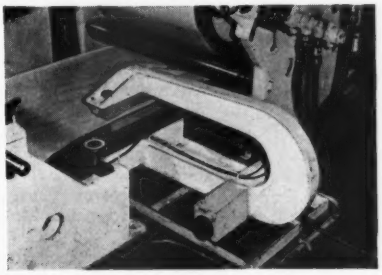


The Analmatic automatic laboratory.

One of the most interesting exhibits was the Analmatic automatic laboratory designed and built by Baird and Tatlock (London), Ltd., in co-operation with A.E.R.E., Harwell. The illustration shows one example of the use to which these laboratories can be put and depicts the set-up for continuous analysis of liquor, sampled from four different sources, for a particular element. The sequence of operations is the drawing off of the sample, the adding of two reagents and reduction with hydrogen. The results of the absorptiometer examination are recorded on the chart as a concentration of the sample being examined in grams per litre of liquor. The whole unit is capable of being designed to do a number of varying analytical processes in a continued operation, thus relieving trained staff from routine obligations.

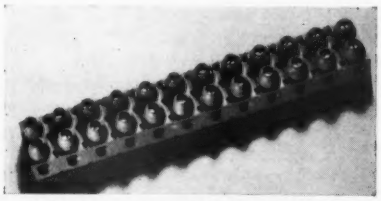
Thickness or weight per unit area gauging by the use of radioactive isotopes was shown by Baldwin Instrument Co., Ltd. The Atomat works on the principle that when beta radiation is directed at a sheet of material, part is scattered, part absorbed and part passes through. By means of a detector plate the amount passing through is measured and depending on whether the sheet has a constant density or not the thickness or weight per unit area is automatically recorded.

Fielden Electronics, Ltd., were demonstrating their level control apparatus and level indicators. The principle of electrical capacity is employed to actuate a switch for the fading mechanism or alarm system. The change in capacitance of the probe caused by the approach of the material provides the initial impulse. The instrument is suitable for both liquid and solid materials.



The Atomat thickness gauge by Baldwin Instrument Co., Ltd.

In laboratory equipment, besides the laboratory glassware for various chemical processes shown on the stands of Loughborough Glass Co., Ltd., Quickfit and Quartz, Ltd., and other well-known manufacturers, Electrothermal Engineering, Ltd., showed their electric bunsen. This burner has a power loading of 300 watts and an element temperature of 800°-1,000°. A range of laboratory centrifuges including refrigerator centrifuges were exhibited by Measuring and Scientific Equipment, Ltd., and the smallest having a swing-out capacity of 200 ml. Furnaces and thermostatic ovens were two of the items shown by Griffin and George, Ltd.



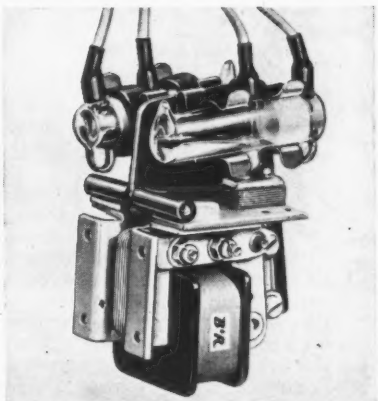
A flexible p.v.c. terminal block produced by Belling and Lee, Ltd. (Not available for export to Austria, France, West Germany, Holland, Italy and Switzerland.)

Instruments for process machinery including thermometers thermocouples, pressure gauges, and electrical equipment were shown on many stands. Kelvin and Hughes (Industrial), Ltd., have a three-position electronic temperature controller which has been designed for the control of extremely critical temperatures. Nullmatic controllers giving a continuous indication of valve pressures shown by Sunvic Controls, Ltd., have a new "plug in" feature which greatly simplifies installation and servicing and obviates the "bump," when the controller is removed. George Kent, Ltd., featured their Commander class of pressure temperature, transmission and automatic control instruments on their stand. Impulse-operated relay switches and miniature mercury relay switches were demonstrated by Besson and Robinson, Ltd.

Seemingly lost among the complex instruments of today was the Arkon visual flow indicator which is a simple ball suspended in a glass dome by the flow of liquid; when the flow stops the ball disappears. Simple but affective and useful in ensuring the circulation of cooling water. It has been produced by Walker, Crossweller and Co., Ltd.

From the use of instruments in plastics to the use of plastics in instruments provides a final note on the exhibition. Many and varied were the materials and their applications. Possibly the biggest being the use of phenolics for instrument casings but polythene and p.v.c. must run very close seconds especially in the electronic side of the industry where their use is not so obvious.

Specializing in instrument cases made from reinforced plastics H. Comoy and Co., Ltd., had many examples on show besides sundry other fabrications and mouldings. Flexible p.v.c. terminal blocks were shown by Belling and Lee, Ltd., and Townson and Mercer, Ltd., showed a patent burette tap fabricated from polythene or p.t.f.e. By the same company was a plastics air-driven mincing motor, the Turbina V. Polythene laboratory ware was included in the equipment exhibited by J. W. Towers and Co., Ltd., and also in the Kjeldahl apparatus for nitrogen determination shown by A. Gallenkamp and Co., Ltd.



Mercury relay switch by Besson and Robinson, Ltd.

The Properties and Testing of Plastics Materials—Part 2 (Cont.)

Section 5. Creep

By A. E. LEVER,* A.I.R.I., and J. RHYS,† M.Sc.

The testing and recording of creep and cold flow and the various methods which have been used to measure these properties are given.

THE time-dependent part of the strain which results from the application of a constant stress is denoted **Creep.** Whilst constant-stress (tensile) creep tests are desirable, the usual one is a constant-load (deadweight) test. It is the increase of strain due to flow under stress.

Recovery is the time-dependent portion of the decrease in strain following unloading of the specimen at the same constant temperature as the initial test. It is equal to the total decrease in strain, minus the instantaneous recovery.

Stress-Relaxation is the time-dependent change in the stress which results from the application of a constant total strain to the specimen at constant temperature. The stress-relaxation at a given elapsed time is equal to the instantaneous stress resulting when the strain is applied, minus the stress at a given time. In other words, it is the decrease of stress due to internal relaxation under conditions of strain. Another term for this property is "stress decay."

Creep tests are made under tension or compression loads at different temperatures, but are not suitable for routine testing owing to the long time test conditions[1]. There is a discussion and good bibliography up to 1944 in [2].

Creep tests relate deformation and time, other variables being fixed, at constant load.

Permanent Set is the deformation which remains upon removal of a fixed load applied in creep tests, or the fixed strain applied in a stress-relaxation test. This is usually taken to be a measure of the viscous flow that has occurred[3].

Cold Flow is also a form of creep, being the change of dimensions caused by a sustained application of a load that stresses the material beyond the elastic limit, at a temperature below the heat distortion point[4].

All these terms are meaningless unless the conditions are defined exactly.

There is a useful discussion and theoretical treatment of the subject[5], together with a description of the I.C.I. Compression Creep, Lever Compression and Shear Creep Instruments.

The Compression-Creep Apparatus consists essentially of compressing a cylinder of rubber between two metal plates and measuring the change in observed deflection with time, at a selected temperature. Stresses can be applied up to 1,000 p.s.i.

The Lever Compression Apparatus enables measurements of either creep under constant stress, or stress decay under constant deformation, under conditions of compression. It is capable of being operated over a wide range of temperature, in air or liquid.

The Shear Creep Apparatus consists essentially of loading a suitably bonded (to metal) rubber sample in shear, and measuring the change in observed deflection with time, at a selected temperature.

Loss of Interference is a decrease of stress due to relaxation internally. It is used particularly in connecting wall sealing rings where the sealing action is obtained by compressing an elastomet ring between the cylinder wall and the piston. Stress relaxation in the elastomer reduces the pressure between the material and the metal and leads to leakage.

An Interference Test[5] is described, with data on the results obtained.

There is an interesting description of the I.C.I. Creep Research Station[6] for non-ferrous materials, including some useful information, e.g. that for some creep tests, the lower the applied stress, the lower the strain of the specimen when fracture takes place.

A method is presented[2] for analysing the data obtained from creep tests for the purpose of predicting the amount of creep of a material over periods of time, longer than those used in the tests.

It is suggested that creep is related to the observed decrease in tensile strength with decreasing rate of load application [7].

An interesting chapter is given on the subject[8], and a short discussion on 'static strength'. This is defined as the load which can be sustained for a period of 30 days with fracture. The resin content of the material has a considerable bearing on the 'static strength'. The author differentiates creep and cold flow as follows:—

Creep—where the rate of change of deformation varies with time.
Cold flow—where the rate of change of deformation is constant.

Creep has its maximum value immediately true elastic deformation ceases and becomes zero, when cold flow commences.

The equipment necessary for creep tests in tension is relatively simple[3], and the basic requirements are:—

(a) Stiff vibration free rack from which to suspend the specimens. (b) Simple dependable means of applying the load. (c) Controlled temperature and humidity. (d) Accurate means of measuring the strain.

Four types are mentioned: (a) Mechanical optical system[9]. (b) Bonded electrical resistance gauge system[10]. (c) A special beam balance which operates against a stress offered by a stretched band of vulcanized rubber[11]. (d) An inclined plane type of apparatus[12].

Creep was measured with an electric strain gauge[13], and from the results an estimate was made of the maximum stresses that can be sustained for five years by thermosetting materials. Thermoplastics were estimated for a period of one year. The apparatus and procedure are described.

Tensile strength (psi) at 25°C. and 75°C., and predicted long time:—

Phenolic filled materials

	25°C.		75°C.	
	Initial	*5 years*	*Initial*	*5 years*
Wood flour ..	7,800	2,000	8,000	1,200
Asbestos ..	4,400	1,500	4,800	—
Chopped Kraft ..	7,700	2,700	6,500	1,200
Macerated fabric.	5,600	2,000	5,600	1,200
Cotton flock ..	7,500	2,000	6,100	1,200
Mica.	5,700	2,000	6,000	—

Thermoplastics

	Initial	*1 year*
Polystyrene	7,500	800
Cell. acetate med.	6,700	600
Cell. acet. but.	3,900	<600
Polymethyl meth.	10,100	2,000

The reliability of measuring creep by electric strain gauges has been questioned, and the matter discussed[13]. Details are given of the Tschenbotanoff method for checking consistency of the electrical circuit over a period of time.

Creep-time relations for polystyrene under tension, bending and torsion are discussed[14], and a description of the test apparatus is given. It is noted that, the presence of creep in a material influences the stress distribution in bending and torsion, i.e., the stresses are no longer linearly distributed.

Tension creep relaxation tests for styrene and acrylic plastics were undertaken[15]. It was found that a 'strain hardening' method for predicting the relaxation curves agreed well with the actual relaxation for both short and long periods of time. A mathematical analysis is given.

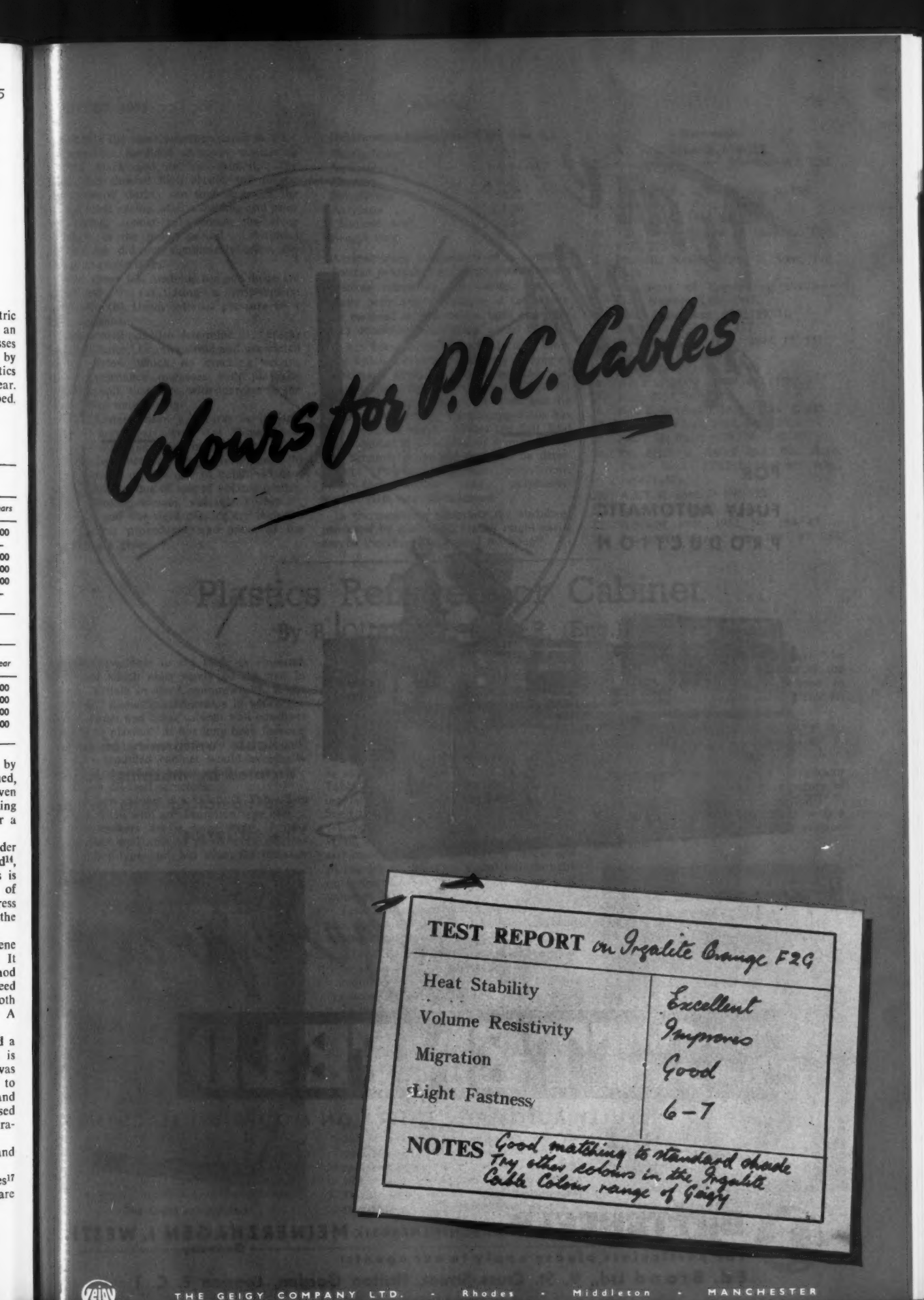
Results of creep tests of a canvas and a rayon laminate at various temperatures is reported[16]. It was observed that the canvas laminate was inferior in creep resistance to the rayon laminate at all temperatures, and the rate of creep of the former increased much more rapidly with increasing temperature than the latter.

There is a mathematical treatment and bibliography.

Creep tests on polythene for cables[17] indicate that the creep characteristics are

* Consultant. † Senior Lecturer in Plastics, National College of Rubber Technology.

Colours for P.V.C. Cables



TEST REPORT on Ingalite Orange F2G

Heat Stability	Excellent
Volume Resistivity	Improves
Migration	Good
Light Fastness	6–7

NOTES Good matching to standard shade
Try other colours in the Ingalite
Cable Colour range of Geigy

Geigy THE GEIGY COMPANY LTD. · Rhodes · Middleton · MANCHESTER

Time calls

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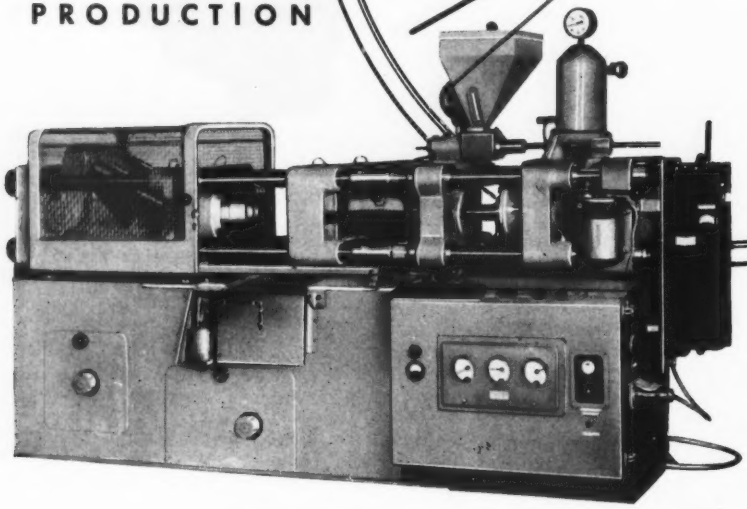
FULLY AUTOMATIC
PRODUCTION



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essentially the same, whether tested as clear compression moulded sheet or containing carbon black and an anti-oxidant. The tests also showed high elastic and plastic deformation during the first stage of the creep. Self ageing, after moulding and prior to testing, appear to increase the creep strength in the initial period. Artificial weathering did not significantly affect the creep characteristics.

Two creep test methods for polythene are described [18]: (a) Using a strip-tension method. (b) Using internal pressure in a tube specimen.

These methods also determine the 'cracking resistance,' i.e., the stress and associated strain below which no cracking occurs. Crack resistance increases with plasticity number and, therefore, with increase in the molecular weight range.

The Lister-Jordan apparatus is illustrated[20 21] and deals with: (a) Dimensional change due almost entirely to flow, e.g., polymethyl methacrylate, polystyrene. (b) Dimensional change due to combined flow and shrinkage due to loss of volatile matter, e.g., cellulose acetate, vulcanized fibre.

Rigid and non-rigid plastics are included in the test procedures, and some of the results are given:—

Deformation under load (Cold flow %)

Phenoplasts	0.4
Aminoplasts	0.4 to 0.7
Ebonite	0.5
Polystyrene	2.22
Acrylates	1.50
Cellulose Acet.	2.64
Benzyl Cell.	76.00

A description is given [22] of a constant deflection procedure for direct measurement of stress relaxation, or change thereof, thereby permitting evaluation of the ability of a material to maintain a tight assembly under conditions simulating actual use.

It has been shown[19] that dielectrics show creep which continues indefinitely as long as the stress is applied. With some materials, considerable creep occurred in the interval between the application of the stress and the first strain observed. Special apparatus has been designed which enables the full load to be applied in a fraction of a millisecond. The dynamic properties can also be determined. Polythene, ebonite, polystyrene, phenol-formaldehyde and polymethyl methacrylate were investigated.

In thermosetting materials the shrinkage produced by continuing curing might easily exceed the extension caused by creep[23].

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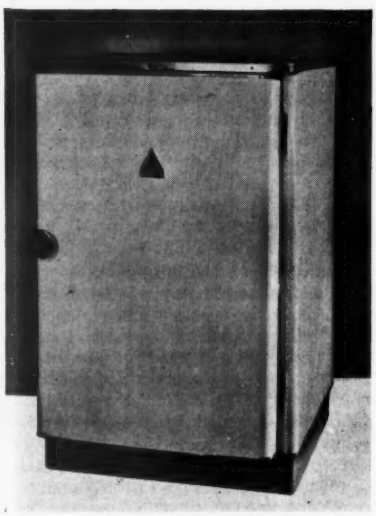
Plastics Refrigerator Cabinet

By B. QUARMBY, A.Inst.R. (Eng.)

NOW available to the trade in England, and which must surely be the first in Great Britain or the Commonwealth, is the "Delta" domestic refrigerator in which the entire inner and outer cabinet wall construction is in plastics. It has long been forecast in the refrigeration industry that an all-plastics moulded cabinet would eventually arrive, and provide better insulation than the common all-steel structure.

The new cabinet is a 2¼ cu. ft. Table Top model, fitted with an absorption type unit.

The makers are a large firm of tube specialists well able to produce an efficient absorption-type unit, but when the research engineers came to the question of cabinet construction, they decided to use only those materials with low heat conductivity. They naturally turned to plastics, and the Delta cabinet is constructed from high-gloss pressed p.v.c. sheeting. The gloss is lasting and is said to be equal to that of the finest enamel.



The Delta refrigerator.

Base of the cabinet, which is recessed, is 3½ in. high, finished in green, to match the Table Top which is made from a hard-wearing laminate. The usual rubber gasket is fitted to the door and is easily replaceable.

Cabinet walls are insulated with Silan Wool, and the insulation in the door, where extreme lightness is desired, is a lightweight plastic foam; this unique and well-thought-out construction in its entirety gives a K value of 0.34.

Tests from an automatic recorder produce the following figures, the basic cabinet temperature required being 43° F.:—

(1) **Cooling times:** Immediately exposed to an ambient temperature of 86° F., the required temperature of 43° F. was reached in the remarkably short time of 2½ hours—in the identical temperature of 86° F., freezing point, 32° F. was reached in 7½ hours.

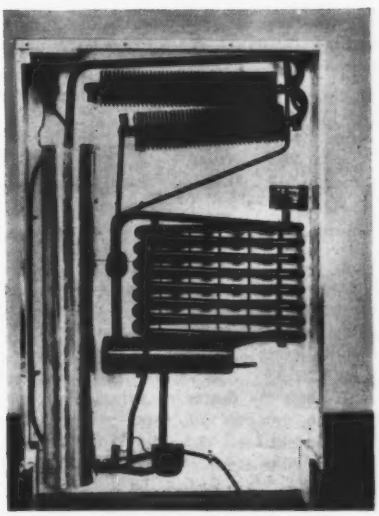
(2) **Limits of constancy:** In the ambient temperature of 87° F., the cabinet kept a constant temperature of 31° F. without heat loading.

(3) **Heat loading:** With a 352 watt heat loading, the average cabinet temperature of 36° F. was measured in an ambient temperature of 86° F., accordingly the specified basic 43° F. required was considerably surpassed and thus classes the Delta unit as a high-performance mechanism.

(4) **Increase in ambient temperature:** The heat loading having been switched off, the ambient temperature was increased to 100° F. at which the cabinet registered an internal temperature of 39° F.

In the ambient temperature of 104° F. the internal cabinet temperature rose to 40° F. only.

Tropical requirements for a refrigerator being based on an average temperature of 47° F. in an ambient temperature of 107° F. the tests are thus fully satisfactory with a view to tropical use as cabinet or replacement unit.



The refrigeration unit.

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. The country of origin for Convention Applications is shown in parentheses. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2s. 8d. each (including postage).

B.P. 728,068. Typewriting machine. R. Wittich (Switzerland).

The bearing framework with journal and pivot bearings, guiding elements and supporting bearings and with the enclosing frame including the keyboard frame are made of a plastic material of high impact bending strength arranged in certain positions to each other. A phenolformaldehyde resinoid with a textile filler is a suitable material.

B.P. 728,069. Envelopes for containing articles of confectionery. C. Kunzle.

B.P. 728,075. Insoles for footwear. To: Scholl Mfg. Co., Ltd. (U.S.A.).

B.P. 728,084. Pressing sheets provided with carding teeth for use in ironing. H. F. Bovensiepen, P. R. Bovensiepen, P. Wolters (Germany).

Sheets for garment steam presses. The backing sheet is (resin-) impregnated before mounting the carding teeth and hardened by heating, e.g., with infra-red rays.

B.P. 728,089. Transfer paper and dry-strip transfers made with such paper. N. Edge. To: Brittains, Ltd.

A mechanically rupturable bond between the paper backing and the carrier film (polyethylene) permits easy removal of the backing before applying the carrier film to the article.

B.P. 728,121. Plating rings. D. M. James.

Used with plates on which food has been served or dished for stacking and keeping hot. The ring is provided with a dish-shaped top for a second meal.

B.P. 728,124. Carriers and supports for plates and the like. D. M. James.

B.P. 728,141. Blank for forming a container and container formed from such blank. To: Reynolds Metals Co.

The blank is formed from two sheets of an impervious pellicle adhered together by a single layer of heat-sealable material. As an impervious pellicle, metal foil or plastics may be used provided they have a higher melting point than the heat-sealing material.

B.P. 728,153. Domestic holders for bobbins of cotton and other sewing thread. A. E. Diack.

For holding a plurality of bobbins between two circular plates.

B.P. 728,173. Domestic pails and the like. G. A. Elliott. To: B.E.F. Products (Essex), Ltd.

The handle is moulded in half-loop shape from a stiff flexible plastic. The pail has a down-turned external lip and the ends of the handle are inserted into slots in the lip with studs integrally moulded with the handle.

B.P. 728,203. Method for improving and controlling the degree of adhesion of polyethylene coatings to paper. To: Union Carbide and Carbon Corp. (U.S.A.).

The coated paper is heated at a temperature from 130-175 deg. C. for not more than 10 seconds.

B.P. 728,214. Index mechanism for rotary electric switches. N.S.F., Ltd., B. W. Millikin.

A multiposition switch with an index plate moulded of tough resilient plastics (nylon).

B.P. 728,219. Printed circuits. P. Eisler. To: Technigraph Printed Circuits, Ltd.

The metal pattern may be created on a fibrous (cloth, paper) support from which it is transferred to a permanent plastic support moulded on to or around the metal pattern.

B.P. 728,229. Method of lining walls, in particular concrete walls. J. Ferrier, J. Boue (France).

For instance the inner wall of a tank or conduit. Made up of a plurality of metal or plastic lining sheets. The lining has a layer of granular material and is incorporated in the wall by means of fresh concrete forming part of the wall.

B.P. 728,253. Syringe useable as a container syringe with or without needle. To: A. M. Bickford and Sons, Ltd. (Australia).

B.P. 728,264. Making unsaturated polyester resin-glass fibre laminates. M. H. Jellinek. To: Union Carbide and Carbon Corp. (U.S.A.).

The glass fibres (cloth) are first cleaned by heating and sized with a solution or emulsion of a vinylpolysiloxane resin. Coating and bonding are then carried out in conventional manner. This method improves the wet-strength characteristics.

B.P. 728,320. Gas burning lighters. To: Ets. Jean Born (France).

In a flexible diaphragm and in an extinguisher containing deformable material, plastics such as nylon may be used.

B.P. 728,335. Cleaning implement comprising a metal sponge with a handle. M. Lefèvre (Belgium).

B.P. 728,343. Tooth-brush. H. Magel (Germany).

Supply container in handle.

B.P. 728,358. Hats. D. A. Green, G. H. Deike, Jr. To: Mine Safety Appliances Co.

Support for a rigid protecting hat with a stiff ring and a band portion to support an interior hat lining.

B.P. 728,381. Cases for discharge lamps. D.-I Rebikoff (Switzerland).

A tubular plastic envelope closed at one end and having a plug through which feed conductors pass to the discharge tube and ignition means inside.

B.P. 728,396. Apparatus for sealing bags. C. Stafford.

For bags of thermoplastic sheet material which when filled are incapable of standing upright without support, especially for bags containing foodstuffs automatically to be sealed in rapid succession to provide an airtight and hygienic package.

B.P. 728,419. Endless bucket conveyors. C. F. Hanser. To: National Oats Co.

For handling food grains, animal feeds, etc., the buckets are moulded in one piece from phenolformaldehyde resin resistant to the build-up of electrostatic charges (danger of fire when transporting dry material).

B.P. 728,455. Manufacture of floor coverings. H. A. Reinhardt, C. R. Johnson. To: Bigelot-Sanford Carpet Co., Inc.

The soft surfacing material is secured in transverse rows to the backing sheet, the rows presenting a U-shaped bottom embedded in an adhesive along parallel lines with a thicker mass of adhesive between the lines. The thermoplastic or thermosetting adhesive may be, e.g., polyvinyl acetate or polyvinyl chloride, urea formaldehyde or phenol formaldehyde resins.

B.P. 728,477. Fountain applicator. R. L. Evans (U.S.A.).

For applying lotions for hair treatment. The distributor on the reservoir includes a hydrophilic sponge made from polyvinyl alcohol.

B.P. 728,539. Mixing machines. To: Robert Bosch, G.m.b.H. (Germany).

The use of a polyamide for co-operating bearing surfaces or sliding parts makes the use of a lubricant unnecessary and prevents discoloration of the food being mixed.

B.P. 728,551. Production of wax-like saturated polyethylenes. To: Badische Anilin- and Soda-Fabrik (I.G. Farbenindustrie A.G.) (Germany).

B.P. 728,595. Travellers for use in the wet spinning of flax and other bast yarns. J. P. Mackie. To: James Mackie and Sons, Ltd.

The traveller is made wholly of a wear-resisting plastic (nylon).

B.P. 728,600. Manufacture of micro-porous material. E. M. O'C. Honey, C. R. Hardy, F. Sharp. To: Pritchett and Gold and E.P.S. Co., Ltd.

The addition of a polyhydric alcohol during the mixing stage reduces the encapsulation of the pore-forming material (powdered starch in polyvinyl chloride with methyl cyclohexanone as solvent).

B.P. 728,601. Process for colouring vinyl polymers. To: Farbwerke Hoechst A.G. (Germany).

B.P. 728,618. Accessory for use with a typewriter. E. C. Tedder. To: Carter-Davis, Ltd.

A guide-bar for a carbon pack with hook-like ends.

B.P. 728,659. Juice extractor for fruit. I. L. T. Accroyd.

Two plate-like hinged jaw members.

B.P. 728,661. Domestic egg cookers. S. Hodges.

For the simultaneous poaching of three eggs with automatic control of the boiling device arranged on a hollow body of triangular shape made from a thermosetting plastic.

B.P. 728,843. Transfer devices for use in typewriters or like machines. S. M. Murray. To: Fanfold, Ltd.

Backing sheets and flexible holding strips.

B.P. 728,848. Electric battery torches. C. K. Fitch.

A preformed assembly including battery, light bulb and electrical connections, all embedded in a block of moulded insulating material.

B.P. 728,888. Lined containers. S. S. B. Rahm (Sweden).

A liner of polyvinyl chloride or of a copolymer of polyvinyl chloride and polytetrafluoroethylene cemented to the outer shell by high frequency current.

B.P. 728,904. Making of sound recordings. C. F. Garner. To: Talking Devices, Ltd.

Additional recordings are multiplied from a master on a long length or strip of plastic based on vinyl chloride-vinylidene chloride copolymers.

B.P. 728,929. Method of making fibrous multi-layer containers. To: Plastic Barrel Corp. (U.S.A.).

The barrel-shaped containers are composed of premoulded self-sustaining blanks of impregnated fibrous material. Each layer is originally an individual container, the layers to be assembled in superimposed relationship.

B.P. 728,930. Flower pots. S. M. N. Rudengren. To: Aktiebolaget Laxa Papersbruk.

Polyvinyl acetate, phenol resin, polythene are added to the moulded mass containing a resin glue as a binder. The pot has a synthetic resin coating.

B.P. 729,048. Injection (plastics) moulding machine. To: Pierwood Plastics, Ltd. (Australia.)

A fully automatic machine, which will continue to mould the article for which it is adjusted so long as material and power are supplied. The machine then stops and cannot be started again until the moulded article has been ejected. A balanced plate (balance trap) set to receive the article ejected from the die operates the electric control switch.

B.P. 729,062. Non-metallic boxes or cases. G. J. Smith, J. P. White, G. J. M. Kok. To: William Mallinson and Sons (Manufacturing), Ltd.

A battery case, e.g., for submarines. Wall and base parts of wood, plastic, laminated plastic, etc.

B.P. 729,066. Venetian blind slats and means and method of making same. J. L. Friedman (U.S.A.).

The polystyrene slat of transverse curvature is oriented by stretching in the general plane in at least one direction.

B.P. 729,119. Process of printing or padding fibrous sheet material. To: Farbenfabriken Bayer A.G. (Germany).

In particular for the printing of textiles from regenerated cellulose.

B.P. 729,122. Process of decorating textile materials. To: Farbenfabriken Bayer A.G. (Germany).

B.P. 729,126. Synthetic resin binders for foundry cores and moulds. W. H. L. Brazier. To: British Industrial Plastics, Ltd.

The thermosetting resin component is a urea-formaldehyde or melamine-formaldehyde powder.

B.P. 729,168. Resilient stoppers. A. Geiger, P. Mundt (Geimuplast OHG) (Germany).

For tablet tubes. An extension on the stopper replaces the usual pads of cotton wool to hold down the tablets.

B.P. 729,210. Process and apparatus for the fabrication of mats of fibres of thermoplastic materials, particularly glass fibres. To: S.A. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny and Cirey (France).

Upstream suction is used.

B.P. 729,252. Vacuum-jacketed vessels, such as flasks, jugs, jars and the like. R. J. Catlin. To: Isovac, Ltd.

The moulded pouring device and seal (rubber or other pliable material) is shaped as a beaded ring with an outwardly curved pouring lip portion.

B.P. 729,291. Stopper. H. Marcel (France).

Head and body as separate parts. The head is transparent so that a printed or decorated foil inserted between head and body is visible through it.

B.P. 729,321. Electrically conductive material. H. C. Harrison, F. S. Breur, P. Gibbons. To: Phoenix Rubber Co., Ltd.

Based on polyvinyl chloride with plasticizer and stabilizer in which finely divided carbon is incorporated.

B.P. 729,465. Electric storage batteries. H. D. Wilson, H. C. Burns. To: Auto-Lite Battery Corp.

A permanent seal between battery covers and containers to withstand extremes of temperature and vibration obtained through a thermosetting phenolic casting resin and an acidic accelerator.

B.P. 729,511. Table lamps. R. S. Williams-Thomas, L. Woodall. To: S. and W. (Lighting), Ltd.

The base part is fabricated in one with the shade part to form a single unit joined by a neck for mounting the electric lamp holder. Translucent plastics may be used.

B.P. 729,537. Loose-leaf binding device. A. Jauss.

A comb-like roll with an endwise slidable grooved-back moulded or extruded in one piece of the same material as the comb.

B.P. 729,581. Anti-dazzle screen for fluorescent tubes. M. Stojkovitch (Germany).

Of moulded plastic material with lateral and longitudinal walls and integrally connected transverse laminae.

B.P. 729,712. Feeding cup. C. L. Luling, R. Buxenstein (Carl Ludwig Luling OHG).

Of transparent clear thermoplastic material with at least two handles opposite to each other.

B.P. 729,733. Method of forming a glare-reducing plastic interlayer for use in bent windshields. To: Libbey-Owens-Ford Glass Co. (U.S.A.).

To form a coloured area whose cut-off line will appear as a straight, horizontal line. A marginal portion of the plastic sheet is coloured, stretched into the desired shape and dried and cooled in this stretched shape.

B.P. 729,734. Glare screens. J. D. Ryan, P. T. Mattimoe. To: Libbey-Owens-Ford Glass Co.

B.P. 729,735. Flame spraying of powder materials. J. A. Neumann.

A mixture of polyethylene with zirconium silicate or rutile (1 to 3 or 2 to 3 parts to 100 parts thermoplastic powder).

B.P. 729,739. Manufacture of materials with adhesive coatings. To: S. D. Warren Co. (U.S.A.).

For heat-sealing. Many resins suitable, e.g., polyvinyl acetate (softening point between 40° and 60° C.) polystyrene (molecular weight 9,000), etc.

B.P. 729,742. Welding thermoplastic materials. B. F. Kellet. To: English Electric Co., Ltd.

The tool is heated by electromagnetic induction so as to cause local softening of a material having a low power factor (polythene), then cooled while the weld is held under pressure to cause adhesion. Heating and cooling can thus be carried out in the same position and in rapid succession.

B.P. 729,755. Dyeing plastic sheets for use in glare screens. J. D. Ryan, P. T. Mattimoe. To: Libbey-Owens-Ford Glass Co.

A graduated shade from deep or opaque at one side of its area to practical extinction of shade at another is obtained by slowly immersing the plastic into the dyeing bath, then quickly withdrawing it.

B.P. 729,756. Plastic interlayers for laminated glare-reducing windshields. R. R. Becksham. To: Libbey-Owens-Ford Glass Co.

B.P. 729,843. Manufacture of shaped articles from comminuted wood and an aminoplast-forming condensation product as a binding agent and shaped articles obtained thereby. To: Badische Anilin- and Soda-Fabrik (I. G. Farbenindustrie A.G.) (Germany).

B.P. 729,881. Refrigerator shelves. D. H. Graham. To: International Refrigerator Co., Ltd.

A light combined shelf and drip-tray moulded or cast as a single unit.

B.P. 729,885. Protecting cap for use with aerosol type of containers. To: Dill Mfg. Co. (U.S.A.).

A cup-shaped cap with a small opening through which the contents from the container will be discharged into the cap.

B.P. 729,896. Grip sleeves for the handles of clubs, rackets and other sporting implements. J. V. T. East. To: Best and Gee Proprietary, Ltd.

B.P. 729,903. Closure for collapsible tubes. V. di Fazio. To: R. Mantovani.

A cylindrical discharge member is attached to the usual threaded cap. When lifted a passage opens between cap and neck for lateral discharge.

B.P. 729,953. Process of preparing closed-cell gas-containing bodies. To: Lonza Elektrizitaetswerke und Chemische Fabriken A.G. (Switzerland).

Polyvinyl chloride and copolymers of vinyl chloride, and also polystyrene, acrylic resins and cellulose esters may be used. The mass containing solvent and/or plasticizer is first mechanically compressed but air passages still remain in the mass for distributing a gas introduced into it under pressure. The mass is then heated still under pressure. Expanded it forms a cellular body of a very regular structure with fine cells.

B.P. 730,052. Waterproof laminated sheet material and method of making such material. B. Messing.

A plurality of thermoplastic sheets (vinyl polymer, polystyrene, polyethylene, cellulose acetate) are fused together at spaced intervals through a plurality of layers of padding material disposed between successive sheets of thermoplastic material. For upholstery, bed pads, table covers, beach blankets, etc.

B.P. 730,054. Method of processing glass-fibre compositions. To: Hawley Products Co. (U.S.A.).

Method for incorporating resins (polyester resins) with glass fibres.

B.P. 730,065. Electric insulators. R. B. Seldon. To: Adams and Benson, Ltd.

The insulator for posts of electric fencing is a moulded cylindrical body of e.g., "Alkathene."

B.P. 730,076. Means of protecting lubrication nipples, cups and the like. D. B. J. Boddy. To: Smith-Richards, Ltd.

The protector of flexible resilient material may be made from a plastic resistant to grease, etc.

B.P. 730,103. Plastic mullions. J. G. Squires (U.S.A.).

A window sash frame with a glass window and a number of strong flexible plastic strips (preferably thermoplastic) adhesively secured to the glass and the frame combine to give the appearance of a mullioned window. The window is shatter resistant.

B.P. 730,159. Screened twin electric cables. To: Fabrica Milanese Conduttori Soc.p.A. (Italy).

The insulation is obtained through an extruded plastic strip with ribs on its two opposite larger sides serving to maintain the surrounding metal screen spaced at the required distance from the conductors.

B.P. 730,178. Sand cores and moulds for the casting of metals. J. J. Sheehan, E. L. Graham. To: Coneygre Foundry, Ltd.

Resins as binders give excellent results if the grains of sand are first coated with a small proportion of a wax as a water-repellant.

B.P. 730,197. Packs for containing and displaying merchandise. R. T. Martin. To: Texwear, Ltd.

A tray with sloped opposite walls and a transparent protective covering.

B.P. 730,208. Spectacles. N. K. G. Rosser. To: Hadley Co., Ltd.

For viewing stereoscopic films. The mounting on a wire may be made as one flat plastic moulding and will not touch the wearer's face.

B.P. 730,221. Artificial leather. H. Eberle, O. Saladin (Germany).

A layer of a dispersion of a vinyl polymer or copolymer with vinyl acetate (or mixtures with methacrylic acid ester polymers) on a fibrous support is heated to evaporate the volatile components so that a network of pores develops.

B.P. 730,235. Bags, sachets and the like intended to contain flowable materials. To: Cellophane Investment Co., Ltd. (France).

One end of the body is completely closed, the other sealed end of a sufficient width has a passage closed by folding the material over on itself.

B.P. 730,248. Lacquers from naphthalene-formaldehyde resins which are elastic after drying out. To: Badische Anilin- and Soda-Fabrik A.G. (Germany).

B.P. 730,289. Electric insulating materials. To: British Thomson-Houston Co., Ltd. (U.S.A.).

A curing process for insulations having varnish impregnants as, e.g., phenol-aldehyde resins, melamine-aldehyde, urea-aldehyde and silicone resins not requiring oxidation for drying.

B.P. 730,306. Curtain supports. H. Jacobs.

To be produced by a moulding process whether including a runner portion or not. The support takes the form of a depending plate-like part with a pin-receiving recess.

B.P. 730,331. Automobile windshield cleaning apparatus. M. Suisse (France).

Includes a plastic pump casing.

B.P. 730,364. Cigarette-holder. J. M. Barnett.

With a frusto-conical shaped socket in the entrance mouth to retain a filtering substance in the holder.

B.P. 730,399. Panel-forming machine. To: Alexander H. Kerr and Co. Inc.

Prefabricated sheets of material capable of polymerization under heat and pressure are integrally formed into structural load-bearing panels.

B.P. 730,426. Rectilinear motion bearings. E. Bally.

The external race of a ball bearing for furniture (drawers, doors) consists of nylon.

B.P. 730,438. Toy figures. F. Steiner (Germany).

A thin hollow body with thicker edge strips into which a sound-producing device is built in.

B.P. 730,471. Housings for measuring or indicating instruments. H. Butler. To: Howard Butler, Ltd.

A composite case for the instrument movement, dial and indicator (e.g., of instruments for vehicles) with an inner cup-shaped body formed as a moulding of translucent material sealed by a closure with a transparent window.

B.P. 730,476. Polymeric substances. A. Charlesby, M. Ross. To: United Kingdom Atomic Energy Authority.

Process for producing from polymeric esters of methacrylic acid a cellular expanded material having useful mechanical strength and good dielectric properties based on the discovery that if irradiation is carried out below the softening point of the material, a strong cellular mass develops within a hard smooth skin.

B.P. 730,495. Animated figures. Chad Valley Co., Ltd., E. A. Sutton.

The head is formed in two main parts, an inner shell of relatively rigid plastic and an outer cover of rubber closely fitted over the shell. The outer cover can be inflated by squeezing a bulb connected through a tube to the cover.

B.P. 730,503. Dropping or pouring insert for liquid containers. H. Brune (Germany).

The liquid outlet duct of the insert (of polyethylene) is surrounded by an annular chamber with at least one air inlet opening.

B.P. 730,517. Textile cot. J. Rockoff. To: Dayton Rubber Co.

Incorporation of polyvinyl alcohol in cots or roll covers of synthetic rubber-like material for spinning rolls eliminates the tendency to "eyebrowing" (failure to carry short fibres).

B.P. 730,520. Textile cot. To: Dayton Rubber Co. (U.S.A.).

B.P. 730,523. Injectors for insecticides and the like. Rintokil Ltd., E. Fades, N. E. Hickin.

Container with a cap having a tubular extension ending in a nozzle with a restricted orifice and a tube in the bore of the extension reaching into the interior of the container.

B.P. 730,524. Holder for sheets, cards and the like. M. Zell (add to B.P. 698,584).

B.P. 730,606. Hermetically-sealed, cased condensers and other electrical components. R. J. Cook. To: London Electrical Mfg. Co., Ltd.

An elastomeric material is used which is compressed against the surface of a metal ring united with the wire and which adheres to the plastic casing.

B.P. 730,641. Moulding cylindrical pieces from high-melting polyamides. L. L. Stott. To: Polymer Corp. (add B.P. 655,892).

The polyamide is melted in a screw-feed device, discharged through a nozzle into a preheated mould, which is then closed and rotated to distribute the charge centrifugally into the form of a cylinder. Rotation continues during cooling below solidification point.

B.P. 730,643. Articles or pieces of polyhexamethylene adipamide. L. L. Stott, W. J. Davis. To: Polymer Corp. (U.S.A.).

The article is heated to 400-500° F., then cooled at least to boiling point of water at a cooling rate sufficiently low to prevent internal strain.

B.P. 730,655. Machine bearing and the like. H. M. Whitcut. To: I.C.I. Ltd.

Comprising a synthetic resin having a tensile strength greater than 2,000 lb./sq. in and a Brinell hardness greater than 2, and incorporated therewith a minor proportion of finely divided polytetrafluoroethylene.

B.P. 730,692. Coloration of plastic materials. L. E. Jones. Comm. from: Compagnie Française des Matières Colorantes.

Perinones have remarkable resistance to heat and are particularly suitable for the coloration of plastic materials in bulk, in particular where moulding is carried out at high temperature.

B.P. 730,700. Production of filter elements for filter-tip cigarettes. V. E. Yarsley.

"Active" cellulose acetate flake particles are sprayed with an aqueous solution of a water-soluble adhesive and extruded as a cylindrical rod.

B.P. 730,725. Packaging hydroscopic sponge. S. P. Vaughn.

B.P. 730,733. Metal working lubricating compositions. To: N.V. de Bataafsche Petroleum Maatschappij (Netherlands).

The life of tools can be prolonged by using oil-in-water emulsions having incorporated therein a homopolymer of a vinyl halide or a vinylidene halide or a copolymer of these halides with an unsaturated organic compound.

B.P. 730,750. Plastic injection-moulding machine. J. W. Hendry. To: Jackson and Church Co.

The ejecting from the machine and the injecting onto the moulds are done in a vertically upward direction.

B.P. 730,812. Electric wires and cables. Cables and Plastics, Ltd., H. S. Pilling.

At least one conductor is covered with an insulating material, then with a firmly adherent sheath of polyvinyl chloride and then with an outer sheath of nylon adhering firmly to the polyvinyl chloride sheath.

B.P. 730,836. Sealable container of thermoplastic material and sealing apparatus therefor. W. Kunik (Germany).

The (polystyrene) container has a bead below the open top and a corresponding beaded cover with a skirt and a (rubber) sealing ring inside. The two beads are welded together at spaced points to secure the seal. Excess pressure can escape when the sealed container is heated (for canning) and, after cooling, the welding causes additional sealing.

B.P. 730,868. Knitting pins. A. H. Vale. To: Abel Morrall, Ltd.

Relates to "circular" type knitting pins with relatively stiff pointed end parts. The connection between these parts and the flexible curved part (wire) is made by a connector of nylon with a spigot projecting from a surrounding sleeve and a socket.

B.P. 730,869. Thermoset styrene co-polymers. G. H. Segall, J. F. C. Dixon. To: Canadian Industries (1954), Ltd., Du Pont Co. of Canada, Ltd.

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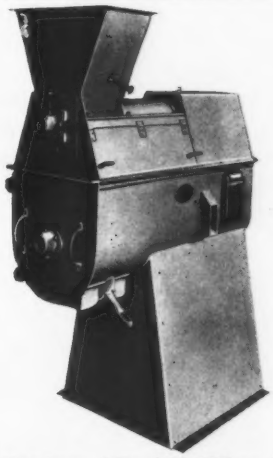

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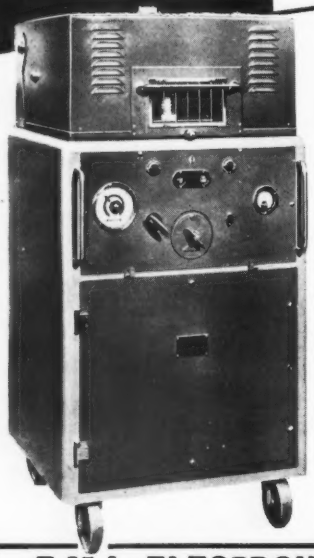

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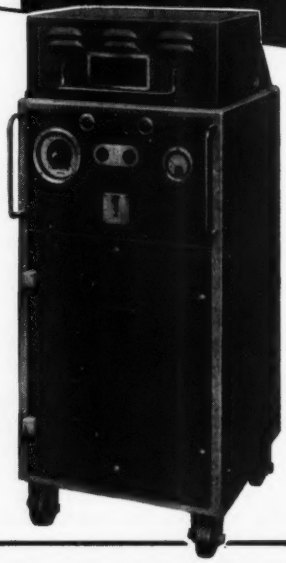

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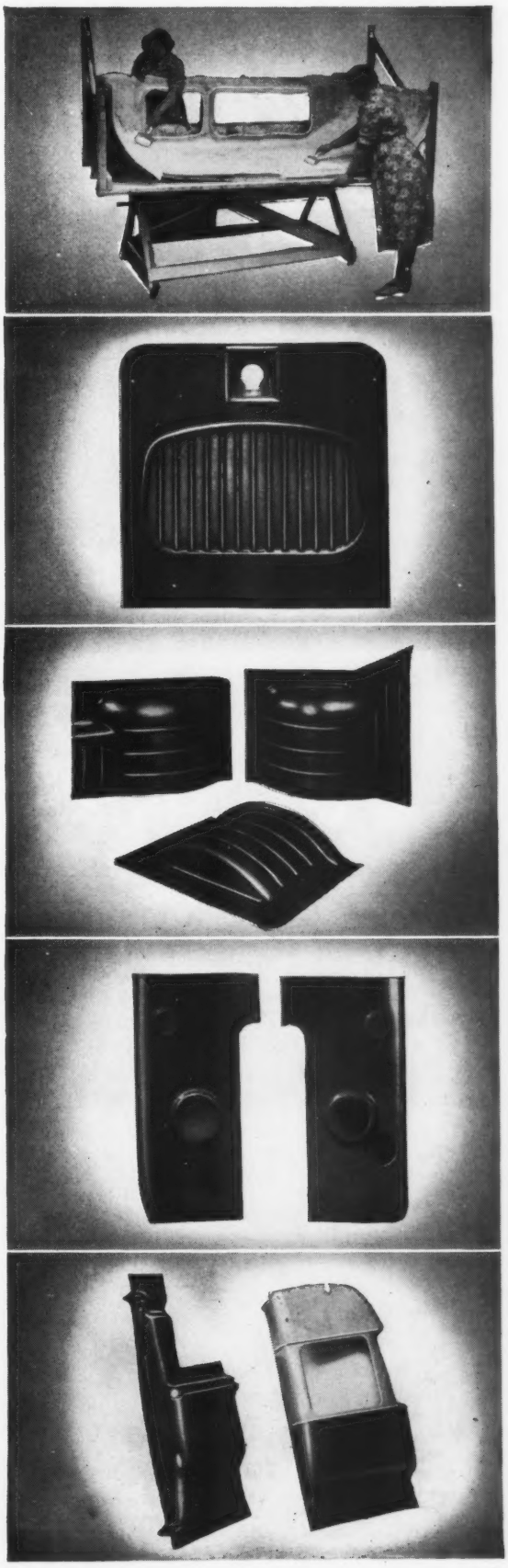

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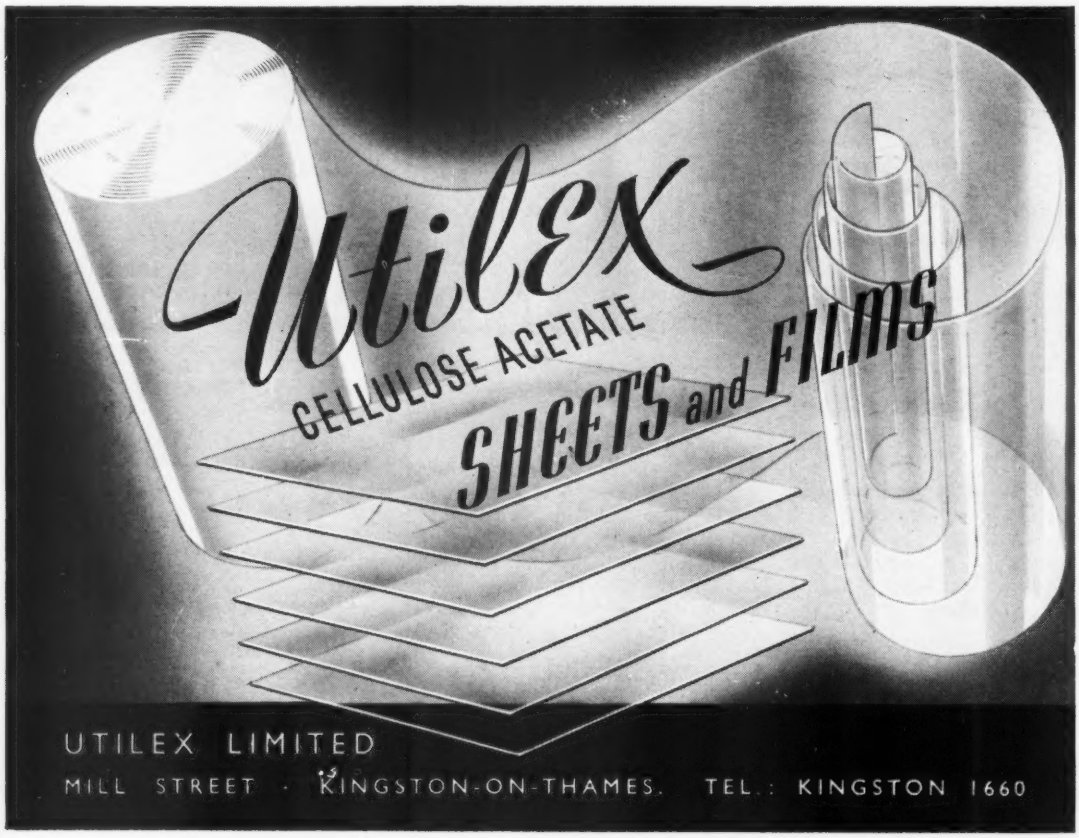

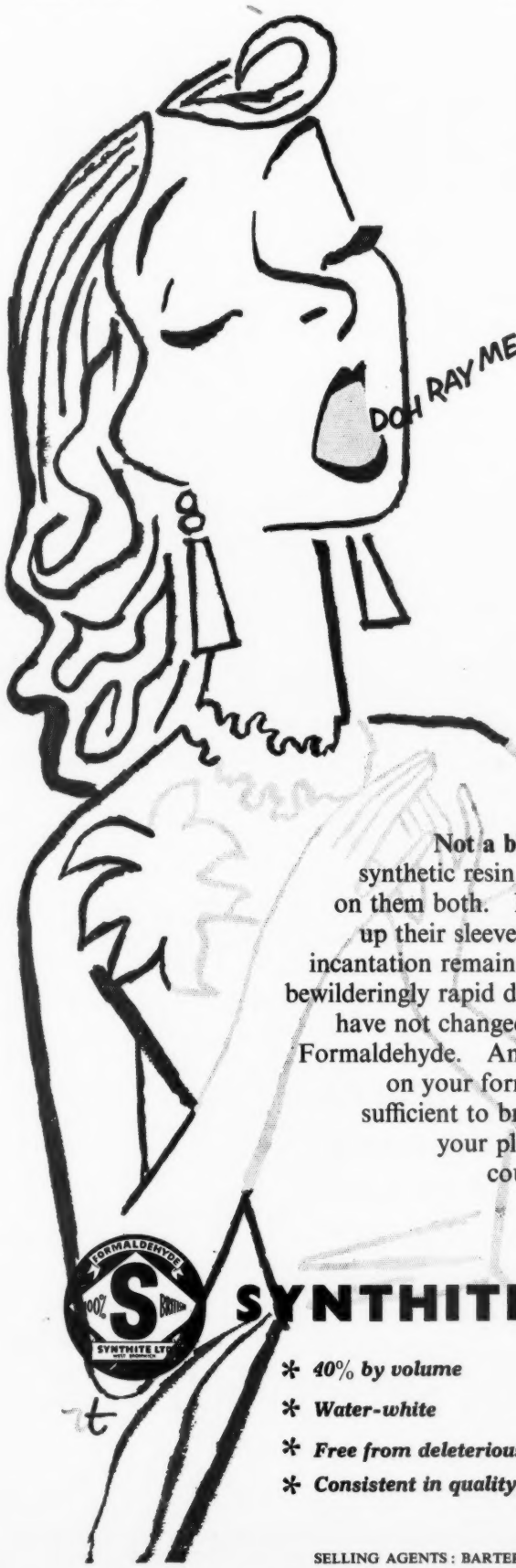

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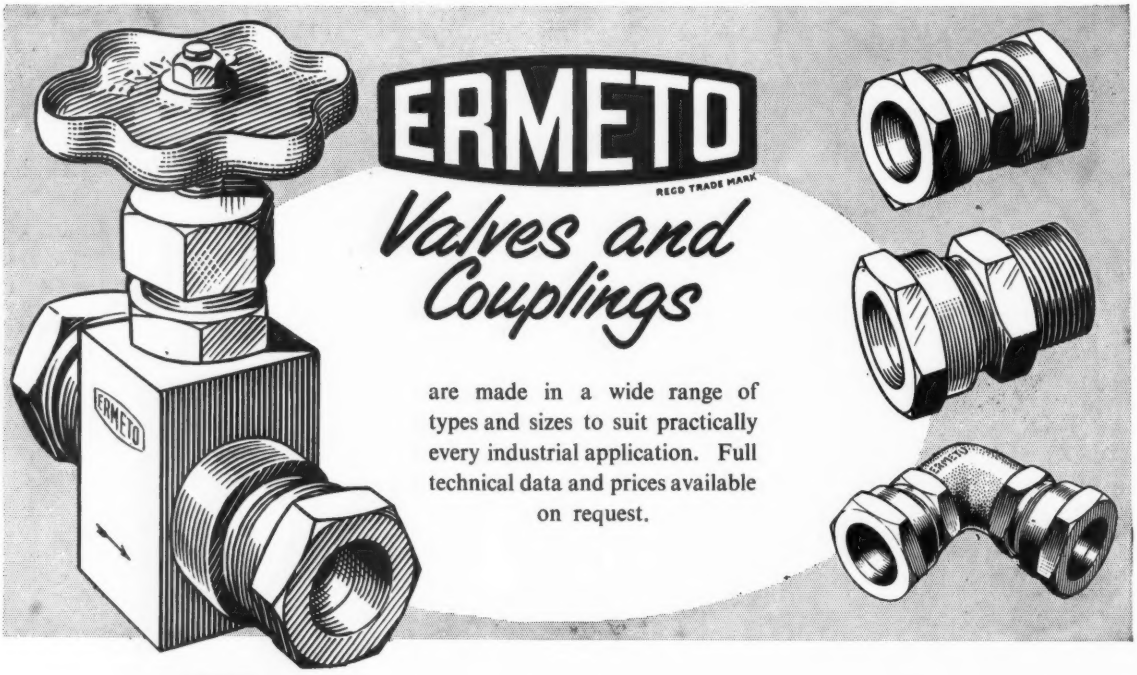
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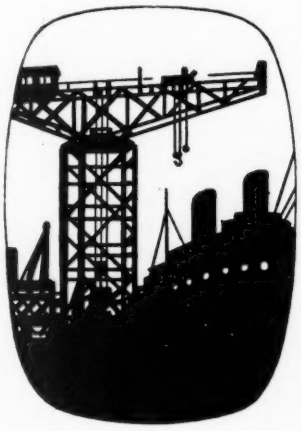

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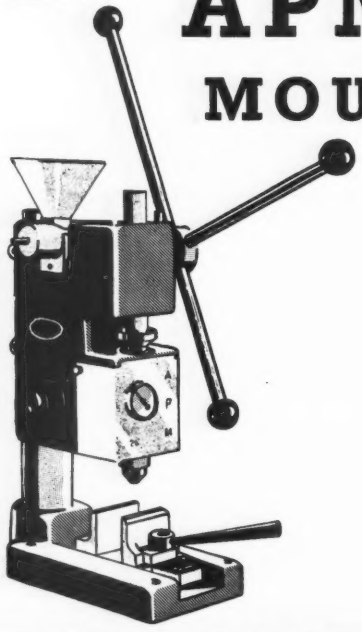

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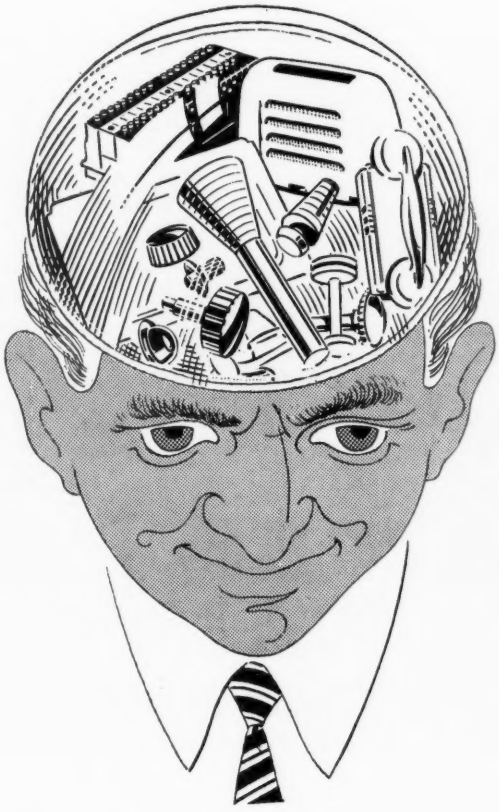

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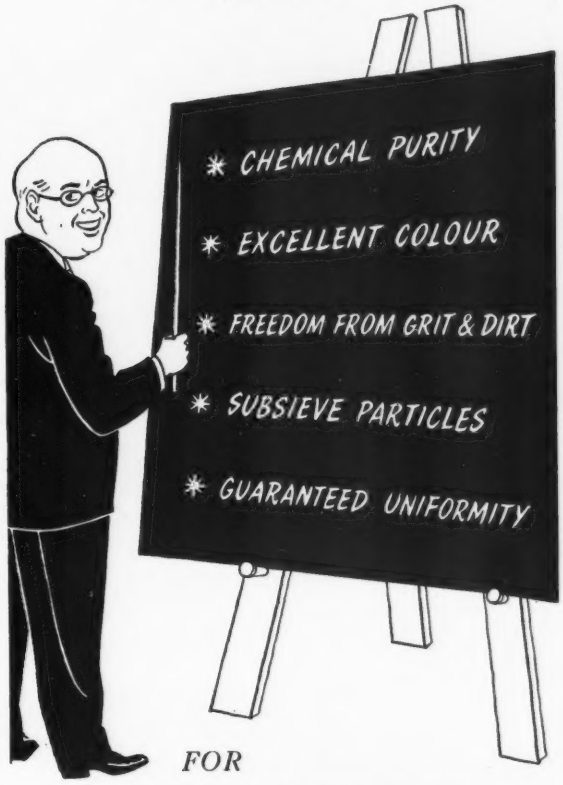

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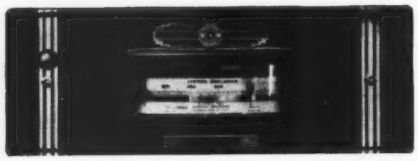

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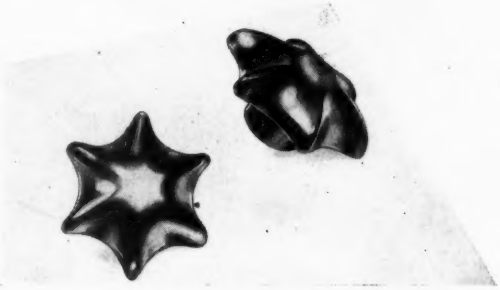

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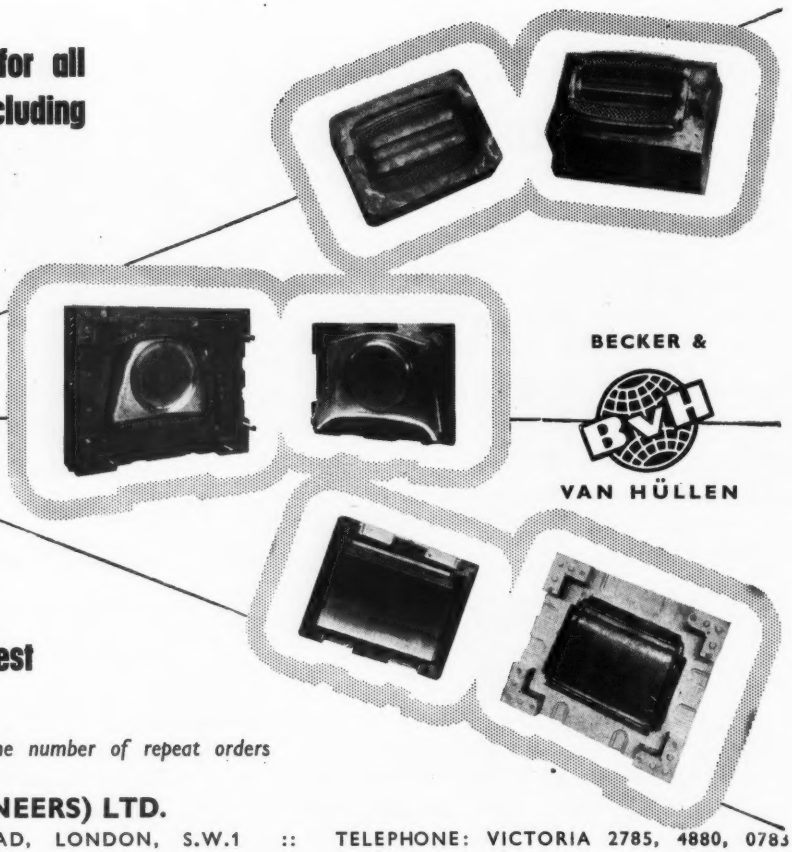

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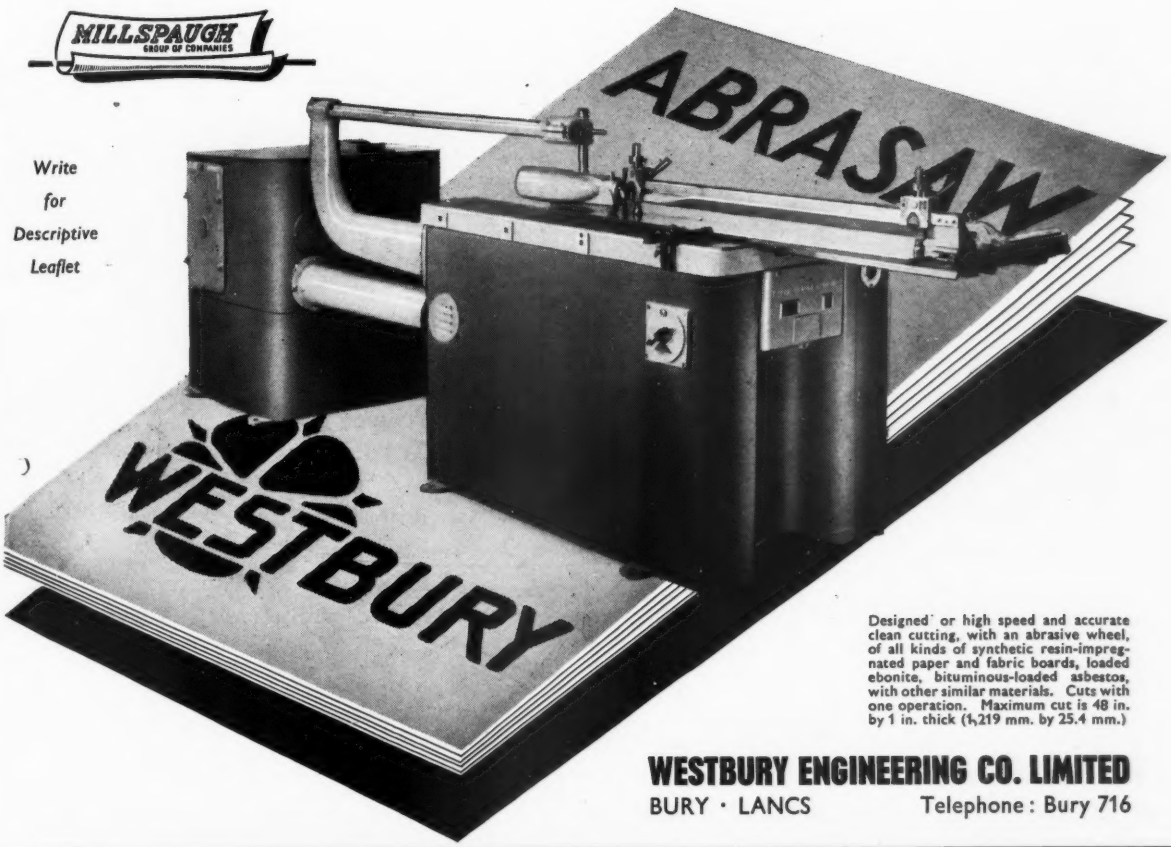

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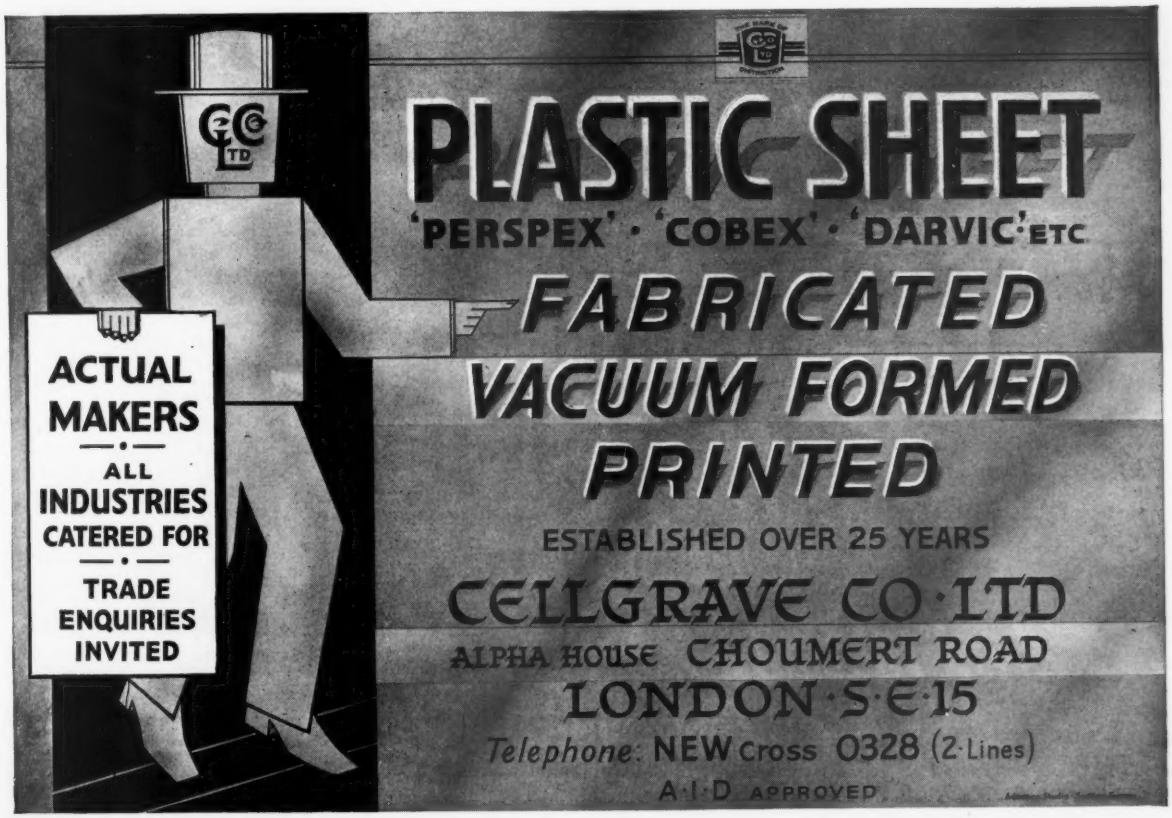

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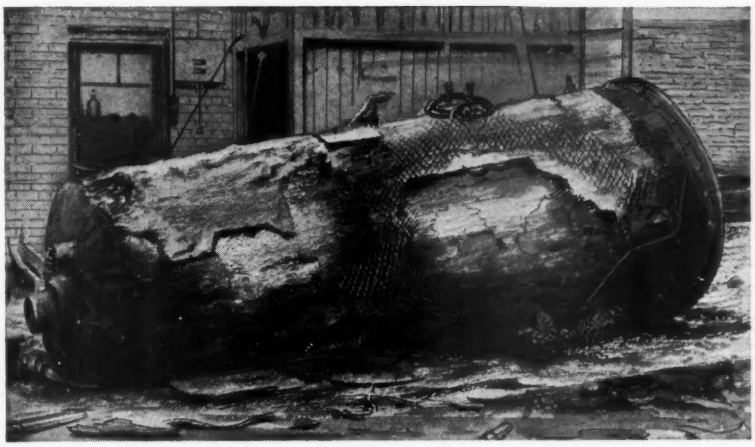

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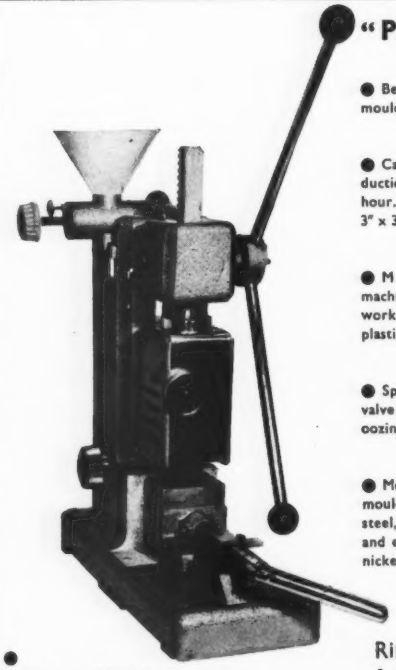

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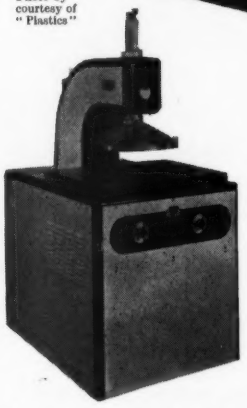

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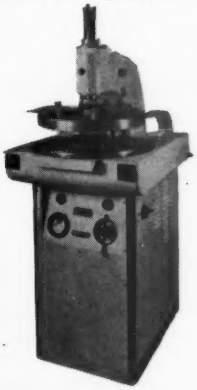

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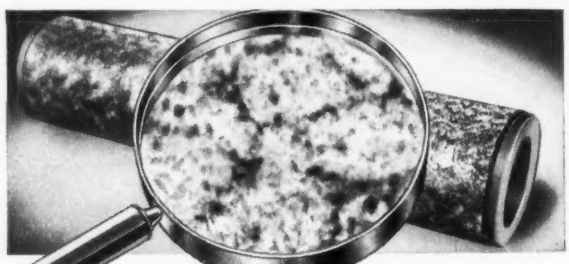

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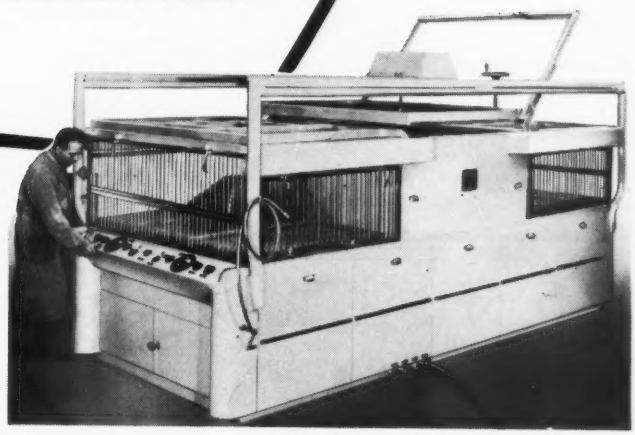

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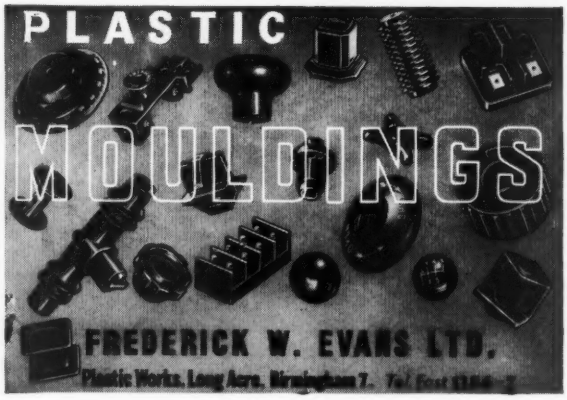

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HYDRAULIC. Frazer Mono-radial pumps, new and second-hand in stock. Thompson and Son (Millwall), Ltd., Cuba St., London, E.14. East 1844. zzz-483

ALTERATIONS. Diesel sets, electric motors, switch gear, transmission equipment, fluorescent lighting and industrial fittings ex stock, keen prices. Contact G. L. Murphy, Ltd., Manston, near Leeds. zzz-489

STOCK DELIVERY. Four-cylinder hydraulic pumps, 4 g.p.m., 1 ton pressure, £30; or motorized 3-phase, £70. John Steel, Castlefields, Bingley. zzz-495

PLASTICS MACHINERY.

Hydraulic Presses of all sizes. Injection Machines, Extruders. Mixing Mills. Hydraulic Pumps and Accumulators.

Send your requirements to the specialists.

REED BROTHERS (ENGINEERING), LTD.,
REPLANT WORKS,
CUBA STREET, MILLWALL, E.14.
Phone, East 4081 (five lines). 217-18

FOR SALE. 10-gramme Francis Shaw hand-injection moulding machine with a die lock, any examination welcomed, £50. 24 The Triangle, Mountain Ash, Glam. 217-x5116

PRESSES. Four 160-ton Werner and Pfleiderer hydraulic presses and pumps, in nearly new condition, for sale at attractive figure. Box P1713, care of " Plastics." 217-2

MIXING MACHINES for sale, second-hand, open pan bakery type with removable pans as required. Bakers Machine and Equipment Co., Ltd., 77 Westgate Rd., Newcastle-upon-Tyne. 217-x6093

FOR SALE—6-8-oz. Windsor, excellent condition, as new. Apply: W. W. Ball and Sons, Ltd., Kennel Lane, Billericay, Essex. 217-27

Machinery, Tools and Plant (contd.)

HYDRAULIC PRESSES.

Six 1,160-ton upstroke presses by Robertson and Orcher, glanded ram 33¼-in. dia. by 15-in. stroke, four columns 8 in. dia., distance between 7 ft. 1 in. by 17 in., semi guided moving table and head with working area 6 ft. 5 in. by 4 ft., daylight 13¼ in., W.P. 3,000 lb. sq. in. fitted 2 C.I. platens 6 ft. 5 in. by 4 ft. by 4½ in.

Seven 400-ton downstroke presses by Greenwood and Batley, ram 16-in. dia. by 30-in. stroke, W.P. 2 ton sq. in., four columns 5½ in. dia., distance between 22 in. by 17¾ in., fully guided moving table, working area 31¾ in. by 22 in., daylight 54 in.

350-ton self-contained downstroke press by John Shaw, main ram 21-in. dia. by 29-in. stroke, W.P. 1 ton sq. in., four columns 5½ in. dia. distance between 36⅜ in. by 18¼ in., fully guided moving table, working area 36 in. sq., pr. electric platens 36 in. sq., daylight 33 in., Hele Shaw pump, motorized 400/3/50.

285-ton upstroke multi daylight platen press by Iddon, ram 19-in. dia. by 15-in. stroke, four columns 4½ in. dia., distances between 31½ in. and 13½ in., to head and table are fitted steam heated platens 30 in. sq. by 2 in. thick with intermediate platens giving four daylights of approx. 4¾ in., platen W.P. 100 lb. sq. in. press W.P. 1 ton sq. in.

250-ton upstroke press, ram 18-in. dia. by 15-in. stroke, W.P. 1 ton sq. in., four columns 5⅝ in. dia. distance between 22½ in. by 18 in., semi guided tee slotted table 30 in. by 14 in. by 9¾ in. deep, daylight 14½ in.

200-ton downstroke compression or transfer moulding press by Hydraulic Eng., main piston type ram effective dia. 11-in. by 9¾-in. dia. rod by 12-in. stroke, fixed and moving tables each with working area 30 in. by 21 in., max. daylight 30 in., W.P. 2 ton sq. in.

160-ton downstroke press by E.M.B., ram 12-in. dia. by 13-in. stroke, tee slotted moving tables 26 in. by 19 in., daylight 16 in., ejector or transfer ram 5½ in. dia. by 6½-in. stroke, main pressing power 160 ton, mould breaking power 14 ton, ejector power 35 ton, W.P. 1½ ton sq. in., Towler electraulic pump.

GEORGE COHEN, SONS AND CO., LTD.,
WOOD LANE, LONDON, W.12.
Phone, Shepherd's Bush 2070
AND
STANNINGLEY, NR. LEEDS.
Phone, Pudsey 2241. 217-30

IMPREGNATION PLANT FOR SALE, 4 ft. 6 in. by 3 ft. by 17 ft. high, 14 yd. material to load satisfactory on width up to 31½ in., heated by hot air from attached gas oven and blower.
Stabilizes at 80 degrees C. in 40 minutes, electric supply, 230 volts single phase feeding variable-speed drive.
Resin bath level adjustable with variable squeeze from rubber roller. Box P1723, care of " Plastics." 217-32

FIVE FRANCIS SHAW HAND-INJECTION MOULDERS FOR SALE. For thermoplastic material. 220-230 volts. Capacity 1 shot per min., ⅜-oz.; 3 shots per min. ⅛-oz. Diameter of injection ram, ⅞ in., working surface of die plates 7 in. Photo. F. J. Edwards, Ltd., 359 Euston Rd., London, N.W.1. 217-29

TWO INJECTION MACHINES, 2-3-oz., Continental make, with hydraulic pump and compressor unit, for sale, £850. In good working condition. Seen London. Box P1717, care of " Plastics." 217-42

MACHINERY, TOOLS AND PLANT WANTED

COMPRESSION AND INJECTION-MOULDING TOOLS WANTED. Send details of your surplus, obsolete and redundant moulding tools. Box P1311, care of " Plastics." 218-1129

INJECTION MOULDING MACHINES required. Condition or size not important. Send details. Box P0814, care of " Plastics." 219-1138

INJECTION MOULDING MACHINES required. Size or condition not important. Details to Box P1126, care of " Plastics." 217-1144

MISCELLANEOUS

EXTEND YOUR TRADE.
Use a trade mark. Consult
Trade Mark Protection Society,
12 Church St., Liverpool. zzz-294

NOTICES

THE " NORTH " PATENT FOR PROTECTIVE GLOVES.

LETTER PATENT NUMBER 624795.

The above patent is a basic patent for protective gloves and James North and Sons, Ltd., will take immediate legal steps to prevent its being infringed.

This patent was admitted to be valid in the action WHITE and JAMES NORTH AND SONS, LTD., versus TEDSON THORNLEY AND COMPANY, in which MR. JUSTICE LLOYD-JACOB on the 26th day of July, 1955, made an order for an injunction, damages and costs, as a consequence of its infringement and dismissed the defendant's counter-claim.

Tedson Thornley and Co., who admitted the validity of the North patent, will shortly be granted a licence to continue working their existing process. 217-44

PATENTS

THE PROPRIETORS of British Patent No. 669423 for " Anchoring means for the flexible diaphragms of shape-forming devices " will grant licences or will sell the entire British Patent Rights. Inquiries to Bromhead and Co., Chartered Patent Agents, 376-379 Strand, London, W.C.2. 217-22

PRODUCTION CAPACITY

POLYSTYRENE AND CELLULOSE ACETATE INJECTION MOULDINGS up to 2 oz. Reliable service. Latest-type machines. Keen co-operation on new lines. W. H. Adamson Plastics, 39 Hedley St., Maidstone. 219-1132

INJECTION MOULDINGS AND PLASTIC COVERING IN ACETATE ALKATHENE, P.V.C., POLYSTYRENE AND DIAKON.

Machined Parts in Brass, Steel and Plastics.
We solicit your inquiries.

F. A. KETCH AND SON, LTD.,
TRENT VALLEY WORKS,
LICHFIELD, STAFFS.
Phone 3591 and 3592. zzz-500

INJECTION MOULDING CAPACITY available up to 4 oz. Keenest quotations, prompt deliveries. Fully automatic plant. Rees Plastics, Ltd., 287 Liverpool Rd., London, N.1. Nor 4310. zzz-501

KINGSTON PLASTICS, LTD., Unity Works, Union St., Kingston-on-Thames. Manufacturers of virgin and second-grade cellulose acetate moulding powders, matched to customer's own requirements for colour and flow. Customer's own waste also reprocessed to specified requirements. Sorting and grinding, incorporating magnetic separation of metallic particles of all thermoplastics undertaken. Phone, Kingston 8405. 219-1139

VISIJAR LABORATORIES, LTD.,
THE LEADING CRAFTSMEN IN
" PERSPEX."
PROTOTYPE AND REPETITION.
OFFICIAL I.C.I. STOCKISTS " PERSPEX "
SHEET, TUBE, ROD.
STOCKISTS AND FABRICATORS OF " FORMICA."
149 LONDON ROAD, CROYDON, SURREY.
Phone, Croydon 8228 (two lines). zzz-492

INJECTION MOULDINGS by I.O.G. Industries, Ltd., 41 Marshgate Lane, Stratford, E.15. Maryland 2804. 220-1094

INJECTION MOULDINGS IN THERMOPLASTICS. Moulding in styrene, acrylics and acetate. Design and toolroom facilities available for mould construction. Inquiries invited. J. and E. Courtenay, Ltd., 138 Stratford Rd., Birmingham, 11. 220-1141

PLASTICS (MANCHESTER), LTD.,
BRITAIN'S LEADING STOCKISTS AND DISTRIBUTORS.
SPECIALISTS IN
FABRICATION, INJECTION MOULDING AND ENGRAVING.
11 WHITWORTH STREET,
MANCHESTER, 1.
Central 7081-2 and Central 1000. zzz-493

VACUUM MOULDERS invite trade inquiries for vacuum-formed articles moulded in p.v.c., styrene, cellulose acetate, etc. Maximum mould size 36 in. by 36 in. Write Box P098, care of " Plastics." 217-1112

ELCO PLASTICS, LTD.,

HIGH WYCOMBE,

BUCKS.

A.I.D. APPROVED.

MOULDERS, INJECTION COMPRESSION,

TRANSFER, SIDE RAM.

HIGH WYCOMBE 1921-2. zzz-498

COMPRESSION MOULDING CAPACITY available (250-750 tons) for next six months. Reply Box P179, care of " Plastics." 217-5

REPETITION in Ebonite, Erinoid, etc. Capstan lathe work. Temple St., Rugby. Phone 4059. 223-1118

DINES PRODUCTS, Whitehall Lane, Grays, Essex, for injection mouldings. 223-1120

SHORT RUNS A SPECIALITY: LONG RUNS A PLEASURE. Low mould cost and overheads. Injection capacity and technical knowledge at your service. Westminster Plastics, Temple Works, 41 Old Church Rd., Chingford, E.4. Silverthorn 7927. 223-1121

Production Capacity (contd.)

COMPRESSION MOULDING CAPACITY available up to 150-ton presses, will accept sub-contracts; prompt deliveries at competitive prices. Write Box P151, care of " Plastics." 220-01138

TUBE LAMINATION AND ENGINEERING, LTD.,

HIGH WYCOMBE,

BUCKS.

MAKERS OF S.R.B.P. TUBE " LAMTUF."

LIGHT ENGINEERS.

HIGH WYCOMBE 1921-2. zzz-499

CHIPPING OF PLASTICS AND GRINDING, screening, mixing and drying of all raw materials undertaken for the trade. Crack Pulverizing Mills, Ltd., Plantation House, London, E.C.3. Man 4405. zzz-487

PLASTICS COMPANY WILL SHORTLY HAVE AVAILABLE
FACILITIES FOR CALENDERING CUSTOMERS' APPROVED P.V.C. MATERIALS.
QUANTITIES ONLY.
WRITE BOX S916, care of STREETS,
110 OLD BROAD STREET,
LONDON, E.C.2. 218-1154

P.V.C. SLUSH MOULDING AND DIPPING. D. R. Cheshire, Ltd., 43 Newington Causeway, S.E.1. Phone, Hop 1816. zzz-296

PRODUCTION CAPACITY WANTED

SMALL FIRM to undertake polythene moulding; tools provided. Box P174, care of " Plastics." 217-8

RAW MATERIAL

PERSPEX! PERSPEX!! PERSPEX!!! Official stockists for I.C.I. acrylic sheets. Sheets cut to your requirements. Fabrication and mounting specialists to the trade:—
S. C. Errington (Hanwell), Ltd., 132a Uxbridge Rd., Hanwell, London, W.7. Phone, Ealing 5288. zzz-40

ALWAYS LARGE STOCKS OF
CASEIN
RODS, TUBES AND SHEETS.
PERSPEX
SHEETS UP TO 1 IN. THICK.
CELLULOSE ACETATE
CATALIN RODS.
S.R. (PLASTICS), LTD.,
93 ALDERSGATE STREET, E.C.1.
Phone, Monarch 4686. 221-1103

SURPLUS.—4,000 Alkathene rods, 1½ in. dia. by 12 in. long (I.C.I. Grade 20), natural colour. Offers to clear to 28 Elizabeth St., Manchester, 8. Phone, Blackfriars 6038 or 4571. 217-x4146

PLASTICS (MANCHESTER), LIMITED,
BRITAIN'S LEADING STOCKISTS
OF
PERSPEX SHEET, ROD, TUBE.
11 WHITWORTH STREET,
MANCHESTER, 1.
Central 7081-2 and 1000. zzz-494

FOR HOME AND EXPORT MARKET. We sell at low prices all plastic scraps, acetate, polystyrene, alkathene, reground powders and reconditioned powders. Apply to Box P1635, care of " Plastics." 217-13

FOR SALE. 2 tons of Perspex. Apply Box P175, care of " Plastics." 217-7

EXTRUSIONS BY MARLEY

BUYERS REQUIRING RIGID AND FLEXIBLE

TUBES AND SECTIONS

IN

THERMOPLASTIC MATERIALS

SHOULD ASK FOR A QUOTATION FROM

MARLEY EXTRUSIONS, LTD.,

DEPT. 119

LENHAM,

MAIDSTONE, KENT.

HARRIETSHAM 381. 217-17

Raw Material (contd.)

BLACK CELLULOSE ACETATE MOULDING POWDER. We can always supply first grade at 2s. per lb., any quantity. Box P1636, care of " Plastics." 217-14

CUEX, LTD., can offer all at prices well below current list:—
Polystyrene.
Cellulose acetate.
Polyethylene.
P.V.C.
Polyvinyl butyral.
Perspex and Diakon.
Send now for details.
Cuex, Ltd., 270 Corporation St., Birmingham. Central 5474. 217-19

ACETATE MOULDING POWDER, black, 5 tons, at 1s. 4d. per lb. for sale. Box P1714, care of " Plastics." 217-40

ACETATE MOULDING POWDER, black and some colours, several tons for disposal. Inquire Box P1718, care of " Plastics." 217-41

NYLON, reground first sprues, natural and coloured, approximately 3 tons. Write Box P1710, care of " Plastics." 217-39

POLYSTYRENE GROUND IMPACT AND PEARL, good colours, for sale. Box P178, care of " Plastics." 217-38

FOR DISPOSAL, 10 tons good quality black acetate moulding powder, 1s. 6d. lb., delivered U.K.
10 tons nigger brown acetate moulding powder, ideal doll manufacturer, 1s. 6d. per lb., delivered U.K.
Frustrated exports—room wanted. P. E. Rowe, Ltd., Langley Wharf, Chester Rd., Birmingham, 24. 217-25

CELLULOSE ACETATE PUMPS, useful colours, cheap for sale. Please contact Box P176, care of " Plastics." 217-36

RAW MATERIAL WANTED

WANTED, Polythene scrap. Write to Box P7416, care of " Plastics." zzz-0322

ERLANOS, LTD., 93 Aldersgate St., E.C. (Monarch 4686), require Perspex and cellulose offcuts and scrap, clear and coloured; highest prices paid. 217-1079

P.V.C. GARMENT AND HANDBAG OFFCUTS wanted. We collect and pay cash. Brockwell Plastics, Ltd., 50 Hollingbourne Rd., S.E.24. zzz-490

SCRAP.
WE BUY
ALL THERMO-PLASTICS. REJECTED MOULDED PIECES. OBSOLETE MOULDING POWDERS, LUMPS, SPRUES AND RUNNERS.
AND PAY HIGHEST PRICES.
J. W. NASH AND CO., LTD.,
27 BEETHOVEN STREET, W.10.
Ladbroke 4655. 217-15

PROMPT CASH OFFERED for virgin and reprocessed cellulose acetate and polystyene. Give manufacturer's name and backing. Box P873, care of " Plastics." zzz-491

WANTED, large regular supplies of nylon scrap shaving. Hugh Kershaw, Oxenhope, Keighley. 220-1140

WE ARE INTERESTED in buying polystyrene scrap and virgin materials for cash. Box P1127, care of " Plastics." 223-1108

SURPLUS STOCKS of thermosetting and thermoplastic moulding powders wanted. Send details Box P1727, care of " Plastics." zzz-297

THERMO-PLASTICS SCRAP AND SURPLUS LOTS, in large quantities, required for home and export. Please offer with particulars and samples to Herbert Connor, Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 217-37

SITUATIONS VACANT

The engagement of persons answering advertisements in respect of vacant situations must be made through a local office of the Ministry of Labour, or a scheduled employment agency, if the applicant is a man between the ages of 18 and 64 inclusive or a woman between the ages of 18 and 59 inclusive, unless he or she, or the employment, is excepted from the provisions of Notification of Vacancies Order, 1952.

A LARGE INTERNATIONAL ORGANIZATION with rapidly expanding interests in plastics has a vacancy in its London office for an Honours Graduate Chemist to undertake market development work on thermoplastic resins.
Applicants should be about 30 years of age and should have some experience in the processing and/or marketing of thermoplastics. A knowledge of foreign languages will be an asset as opportunities for foreign travel will arise after suitable training. The successful candidate will require to have the necessary drive and initiative to build a commercial career in a large growing organization which offers considerable scope for advancement. Generous pension scheme.
Write, giving full details experience, qualifications, age, etc., to Box ZQ835, Deacon's Advertising, 36 Leadenhall St., E.C.3. 217-x3485

ADVERTISER contemplating manufacture of polystyrene sheet suitable for vacuum-forming process, requires a man with the requisite technical qualifications, experience and ability to establish, organize and control complete production unit for this material.
Details of experience, age and salary, in strict confidence, to Box P1712, care of " Plastics." 217-4

REQUIRED, an experienced man capable of taking charge of compression moulding shop, permanent and well-paid position. Apply " Seaforth," Watchett Works, Oakhurst Rd., Southend-on-Sea. 217-1146

Situations Vacant (contd.)

TECHNICAL STAFF.
Important company with world-wide connections and an expanding glass-reinforced plastics division has openings available now for development staff from research assistants to senior technical officials, capable of running production departments. Modern factory, well-equipped laboratories, and good staff conditions.
Applicants with previous experience in the resin/glass development and production field and/or a suitable scientific background will be given preference.
Apply immediately with full details of previous experience and an indication of the salary required, to Box P173, care of " Plastics." 217-9

CHEMIST required to fill a permanent pensionable post in an industrial research and development laboratory, devoted to new forms of plastics.
Applicants should hold a B.Sc. degree in chemistry, should be of British nationality, have completed military service and not be more than 28 years of age. Please write to Box P171, care of " Plastics." 217-10

CHEMIST OF DEGREE STANDARD required to investigate the use of various materials in the manufacture of laminated plastics.
Applicants must have had a wide experience in the laminates industry. Send full particulars and salary requirements to:
Personnel Manager, Tufnol, Ltd., Perry Barr, Birmingham, 22b. 217-21

GENERAL MANAGER REQUIRED.

MUST HAVE HELD SIMILAR OR SENIOR ADMINISTRATIVE POSITION.

FIRST-CLASS KNOWLEDGE OF PLASTICS AND EXTRUSION INDUSTRY NECESSARY.

PENSION SCHEME.

HOUSING ACCOMMODATION WOULD BE PROVIDED IF NECESSARY.

THE POSITION OFFERS CONSIDERABLE SCOPE FOR THE RIGHT MAN.

APPLICATIONS GIVING FULL PARTICULARS
TO
THE MANAGING DIRECTOR,
MARLEY EXTRUSIONS, LTD.,
RIVERHEAD,
SEVENOAKS, KENT.
217-1148

A PROGRESSIVE AND EXPANDING COMPANY require an experienced plastics technologist, preferably with engineering qualifications, with first-rate managerial ability, to be responsible for a new reinforced plastics department in South Wales.
The successful applicant will be expected to assess technical problems and to organize production economically in accordance with findings. Salary will be commensurate with responsibility and experience, particularly in the field of low-pressure laminates. Box P1629, care of " Plastics." 217-16

CHEMIST. A vacancy exists for a technical officer to work upon research and development of industrial plastics.
Applicants must possess technical qualifications of H.N.C. or above, and be within the approximate age range of 25-35. The successful applicant will join a small department. Within about nine months the department will be transferred from Chapel-en-le-Frith, Derbyshire, to Hindley Green, near Wigan, Lancashire. There is a contributory pension scheme in operation.
Applications in writing, stating age, experience, qualifications and salary required, and quoting reference W/CP, to Personnel Manager, Ferodo, Ltd., Chapel-en-le-Frith, Via Stockport. 217-1145

EXTRUSION—P.V.C. AND POLYTHENE CABLES. Charge-hand wanted with full technical knowledge, long experience and drive, small modern shop; good opportunity and conditions for really first-rate man.
State age, qualifications, previous jobs, references, salary, to " E.C.C.," care of Dixons, 1-9 Hills Place, Oxford St., London, W.1. zzz-295

NEW ZEALAND. Opening exists for experienced Plastics Engineer, preferably with knowledge of extrusion methods, but to operate special machinery, training for which will be given in England. Fare paid out, and successful applicant will be required to enter into at least two years' service contract. Salary £750 per annum, 40-hour week. Two weeks' paid holiday. Inquiries in writing to Box No. 579, Sells, Ltd., Brettenham House, Strand, W.C.2. 217-1147

BECK KOLLER AND CO., LTD., SPEKE, LIVERPOOL, 19, manufacturers of Filabond polyester resins for glass-fibre reinforced plastics, have a vacancy in their Technical Service Laboratory for a demonstrator.
Applicants may be required to visit customers to demonstrate hot and cold laminating on a commercial scale.
Write, giving details of experience and salary required, to the Technical Director. 217-12

EXPERIENCED EXTRUDER required for new plant near London. Box P1716, care of " Plastics." 217-43

Situations Vacant (contd.)

IMPORTANT WORKS IN KENT, engaged in production of plastic sheeting, film and extrusion work, requires services of keen young man to train as technician.

Applicants should have B.Sc. or A.R.I.C. qualifications and should preferably have completed National Service. Modern conditions, including canteen facilities and staff pension fund, are in operation. Please reply in confidence to Box P1719, care of " Plastics."
217-35

MANUFACTURERS (PUBLIC COMPANY) LONDON, shortly establishing plastics division for vacuum-forming process, require the services of a fully experienced man to take complete charge of production.

Applicants must possess thorough technical knowledge of the process and materials used, and be able to organize and control production from start to finish.

All details of experience, age and salary required, in confidence to Box P1711, care of " Plastics." 217-3

NYLON INJECTION MOULDING. Experienced and capable man to take complete charge EMB machine, just commencing in small engineering firm Manchester, good prospects. Write in confidence stating age and experience, Box P1725, care of " Plastics." 218-1150

PETROCHEMICALS LTD., have a vacancy for a Chemist who has specialized in or has industrial experience of colour chemistry in the plastics or other fields.

This position offers interest and scope in existing and new processes. Contributory pension scheme; non-contributory sickness and accident benefit scheme.

Applications in writing, quoting Reference Col/47 should be addressed to the Personnel Manager, Petrochemicals, Ltd., Partington Industrial Estate, Urmston, Manchester. 218-1151

TECHNICAL ASSISTANTS, preferably of Inter.B.Sc. standard, are required for work in the British Geon Ltd., laboratories at Barry, South Wales.

The work is concerned with the development of the fabrication of P.V.C. in the Customer Service and Fabrication Group. The work is interesting, the laboratories well equipped and the positions progressive.

Apply in writing to Staff Manager, Hayes Rd., Sully, near Penarth, quoting Ref. G.46. 218-1152

AN ORGANIC CHEMIST with specialized knowledge of vinyl plastics is required to take charge of a new research and development laboratory near Liverpool. A degree in chemistry or A.R.I.C. is essential, equally important are the capacities to carry out both fundamental research and development work on industrial problems and to supervise laboratory staff. Salary will be in accordance with qualifications and experience. Age range preferably 25 to 35, the position is permanent and pensionable.

Please apply with full particulars to Box P1715, care of " Plastics." 217-1

Situations Vacant (contd.)

NEW ZEALAND. Opening for works manager with all-round experience in injection field, to take charge of development and production for established company in New Zealand. Living accommodation would be arranged and interview take place in England. Write Box P177, care of " Plastics." 217-6

YOUNG LADY, 18-25, with intelligence and some aptitude in science subjects required for post in London in information department of leading plastics material manufacturers, must possess the ability to grasp essentials and to write simple lucid English, education to Inter B.Sc. standard desirable, specialized training will be given, good holidays, non-contributary dowry and pension scheme, staff restaurant, sports club.

Write, giving full particulars of age, education, experience, if any, and salary required. To aid selection, please add a short opinion on the objects of information work in industry.

Information Dept., British Resin Products, Ltd., Devonshire House, Piccadilly, London, W.1. 217-24

A SMALL COMPANY of chemical agents associated with a substantial chemical company have a vacancy for a technical representative. The position includes investigation of various products for the plastic industry.

Applicants must have some knowledge of extrusion and injection moulding.

This opening gives excellent opportunity to a technical man possessing real initiative, enterprise and creative vision who prefers to be more active on the commercial and sales side. Pension and profit-sharing scheme, non-contributory health scheme.

Applications will be treated in confidence. Box P1722, care of " Plastics." 217-33

FOREMAN for injection-moulding department for factory in North London. Must be keen, intelligent and hard working. Progressive situation for the right man.

Please state details of experience and salary required to Box P1721, care of " Plastics." 217-34

TURNER BROTHERS ASBESTOS CO., LTD., Hindley Green, near Wigan, require a technical assistant to the manager of a plastics production department.

This is an excellent opportunity for a keen man to join an expanding organization and to establish a small section responsible for supervising process control and inspection of products manufactured from high- and low-pressure moulded thermosetting materials.

Applicants, not exceeding 28 years of age, should preferably be associates of the Plastics Institute, or alternatively have an engineering qualification with experience in a similar branch of the plastics industry. A knowledge of statistical quality control would be an advantage. Salary according to age, experience and qualifications.

Apply in first instance, in writing, to personnel officer, giving details of age, education and experience. 217-23

Situations Vacant (contd.)

CALENDER CHARGEHAND required P.V.C. works in Scotland; good wages and bonus for right man. Apply Box P172, care of " Plastics." 218-1153

INJECTION MOULDING—Competent man required to take charge of injection-moulding department. Must be capable of setting up, testing and carrying job into full production. 8-oz. Reed-Prentice machines.

Apply: S. Friedland, V. and E. Plastics, Ltd., 8 Gt. King St., Macclesfield. 217-28

DESIGN DRAUGHTSMEN. E. K. Cole, Ltd., Southend, have vacancies in their Plastics Division for mould design draughtsmen. Experience of injection, transfer and compression mould design essential.

Write, stating age, qualifications and experience, to personnel manager. 217-31

HALEX—WORKS MANAGER.

The British Xylonite Co., Ltd., requires a works manager for its Halex Division. Must be experienced in administration, labour relationships and modern mass production and finishing methods. Engineering degree or equivalent desirable. Processes involved are mainly injection and compression moulding of plastics, and the manufacture of brushware, toilet articles and household goods. This is a key position with outstanding prospects for the right man, who will receive the salary necessary to attract him. Contributory and other pension schemes in operation. The present staff are aware of this advertisement.

Applications, which will be treated in the strictest confidence, should be addressed to: The Chairman, Halex, Highams Park, E.4. 217-26

SITUATIONS WANTED

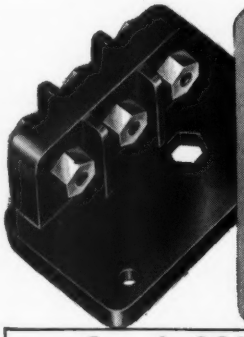
TECHNICAL SALES REPRESENTATIVE. Advertiser engaged in technical capacity with large moulding company seeks position on sales side of the industry. Sound knowledge of compression and injection mouldings and materials. Box P1728, care of " Plastics." 217-x6092

EXPERIENCED SALES REPRESENTATIVE, 42, knowledge mould design, injection, compression, seeks similar position, preferably London and environs where contacts are established. Box P1720, care of " Plastics." 217-x5739

PLASTICS TECHNOLOGIST, age 26, with six years' research, development and production of various plastics, especially p.v.c., seeks responsible post having scope for advancement with progressive company, South preferred. Box P1724, care of " Plastics." 217-x6041

TIME RECORDERS

FACTORY TIME RECORDERS. Service rental. Phone, Hop 2230. Time Recorder Supply and Maintenance Co., Ltd., 157-158 Borough High St., S.E.1. 221-1102



Quality PLASTIC MOULDINGS with Service

Consult SOUPLEX Limited
WESTGATE · MORECAMBE · 'Phone 1717/8/9

OURS ALONE ?
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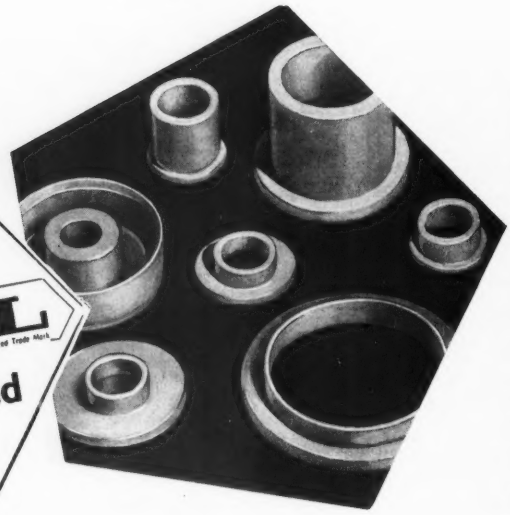

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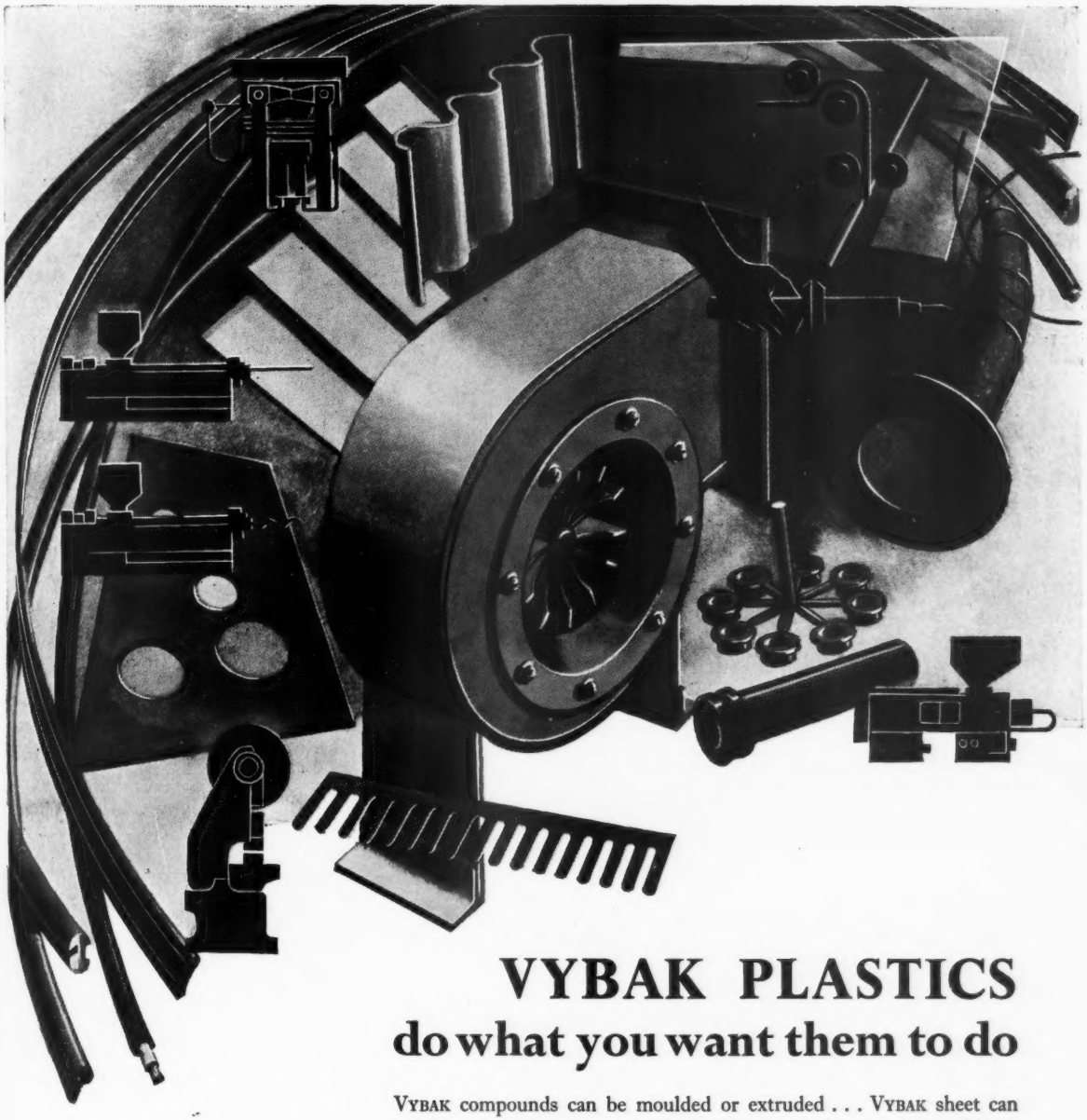

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